THE GRAY SHEET

Computer Industry

REPORT

INTERNATIONAL DATA CORPORATION

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Computer Industry Report
Volume 25

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LARGE SCALE SYSTEMS REVIEW & FORECAST

THE GRAY SHEET
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REPORT

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Ballet of the Big Systems

What's new in the mainframe market?

For the past few years the correct answer has been: Not much. IBM continued to lead in technology directions; others, for the most part, followed. All participants among the non-IBM base, save Cray, witnessed contraction of their installed bases. The market wearily marched forward, driven by the combination of two relentless forces: downsizing and industry life cycles. Growth languished in the low single digits, and there was no solid reason to expect any changes in fortune.

So, in the past 18 months, what's new in the mainframe market? Wait a minute — quite a bit, actually:

- **IBM is preparing a generational leap up to Summit and has much of the market's attention.** Of course, this is both good and bad news: good news because customers are indicating large latent demand for the next round of system technology; bad news because they're displaying little interest in the current stuff. The market has frozen.

- **Japan has arrived and is making considerable and, for performance-hungry customers, harmonious noise.** Hitachi Data Systems has shed the obsequious mantle it was forced to wear by National Semi. Out of the combination of Hitachi and EDS has emerged a company comprising first-rate management, staff, technology, and, using its new high-end offerings as the yardstick, products.

- **In the same week last October, both Digital and Tandem entered the mainframe market.** Their arrival marks the only credible entrances to the large-scale systems industry in a decade.

- **Unisys continues its fight to retain its high-end share**, despite all its "we-are-an-open-systems-supplier" talk. After years of losing ground against the onslaught of other mainframers and downsizing, it appears that the company has stemmed its losses and is digging in for a protracted, and hopefully profitable, stay.

- **Customers are convinced of the utility of mainframes as control and management points in enterprisewide processing.** Although U.S. mainframe business continues to plod, the worldwide market, behind strength in both the Japanese and European arenas, can be expected to grow at a compound rate of better than 6%.

Certainly, no one predicts a return to the day when dinosaurs ruled the computer industry. But it's one thing to say that they'll rule, and another thing to say that they will cease to roam. A worldwide growth rate of 6% per year for the next five years is hardly breakneck, but it is solid growth and does indicate ample fodder for large-systems vendors' consumption.

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Who will be consuming how much is less clear. Seems safe to say that the mainframe industry has some excess capacity, and that additional contraction may be inevitable. Nevertheless, the overall dynamics, risks — and rewards — of competing in the mainframe space make even the high-hanging fruit tempting for the those hungry enough and possessing either long necks or the ability to stretch themselves.

Mainframe Market Dynamics

After experiencing fast growth during the early 1980s followed by years of stagnation, the mainframe market in the latter half of the decade settled into a more predictable pattern of slow growth, particularly in the United States.

However, while mainframe growth may be stabilizing, the industry's structure is subject to substantial imbalance. Change is dominated by a number of issues:

- **New applications are being targeted to substitute technologies.** While widespread replacement of mainframes in mature application areas is not apparent, industrywide a larger percentage of new applications are being targeted for downsized, better price/performing, microprocessor-based technologies.

- **Demand side demographics are shifting.** In user organizations industrywide, the mainframe is becoming less the processing zenith, and more peripheral to emerging desktop requirements. Cooperative processing and decentralized, even distributed, computing goals increasingly are driving user's technology, organizational, and budgetary actions.

- **Reliance on key accounts is increasing.** Generally, only a vendor's largest customers appear committed to building new, and usually massive, applications on mainframes. These "premium" customers are, for the most part, price-insensitive purchasers, indifferent to substitute technologies, and disposed to quickly adopt new mainframe technologies. IBM, among others, is becoming more dependent on these accounts for mainframe revenue.

- **User's capacity and willingness to absorb new mainframe technology is strained.** IDC research indicates that mainframe-class customers are hesitant to invest in the full spectrum of new mainframe functionality. Today's better informed users are questioning the costs versus benefits of migrating mature application workloads to newer high-end systems incorporating complex and expensive functional enhancements. Additionally, they are sensitive to the ultimate impact of new technologies on stable MIS organizations. Today, perhaps more than ever, high-end customers are displaying incrementalist behavior.

- **The size of the expertise pool is limited.** As high-end systems become more complex, the costs of training support staff increases significantly. Escalating data processing salaries indicate a DP labor shortage today. If the current relationships between system performance and required support personnel continue, this shortage will become severe. Personnel costs may become one of the primary constraints facing users as they make information technology investment decisions.

- **IT, particularly MIS, budget pressures are increasing.** Not only are budget growth rates being capped, but IT procurement practices are also increasingly

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WHEN WE SAY WORLDWIDE, WE MEAN IT

With this Review and Forecast issue of the *Gray Sheet*, we are initiating a significant change (and, we think you'll agree, improvement) in how we report data. The market summary pages — known to many of you as the "red pages," from the red background we used to print them against — will no longer be limited to U.S.-based vendors.

Instead, the data will represent IDC's best view of the total worldwide market, including all vendors, from five years back through five years hence. The U.S. market information will remain in the same format, but the international section will encompass all non-U.S. business.

This change reflects the evolution of the market itself. In 1989, the U.S. represented less than 38% of a world IT market of over $270.0 billion. In computer hardware, the U.S. accounted for about 36% of a $102.5 billion market.

It is still true that U.S.-based vendors are by and large the only truly global IT players. In Europe, for example, the only companies with significant market shares in virtually all countries are American manufacturers like IBM, Digital, Hewlett-Packard, and Compaq. The Japanese giants, though, are bidding to modify this imbalance of power, as indicated by last year's transition from NAS to Hitachi Data Systems, the acquisition of Apricot P.L.C. by Mitsubishi in May, and Fujitsu's conditional assumption of majority control of ICL in July.

More importantly, U.S.-based vendors' international sales do not represent a market, but their share of a market. What all vendors, whatever their origin, need to know is the overall size of the market opportunity before them.

The *Gray Sheet* has reported true worldwide data in the past. This issue, though, implements globalization as an ongoing policy rather than an occasional practice, and adds a global perspective to forecasts as well as to current data.

This change is possible because of an intensive effort by IDC analysts to leverage our unparalleled international presence. For over three months, we have been consolidating and refining data and forecasts from the 30 countries in which IDC currently maintains a research presence, from Finland to Argentina, from Malaysia to Hungary.

The information is being presented in a special study, Worldwide Information Technology Spending Patterns, 1989-1994: An Analysis of Opportunities in 30 Countries, with data on the computer hardware, software, data communications, and services markets in each of the countries in 1989, 1990, and 1994. For a copy of the prospectus and information about the study's scope, methodology, and pricing, contact Donald Bellomy at (508) 935-4336.

The bottom line of this undertaking for *Gray Sheet* readers is that we now have what we can say with confidence are the best-grounded worldwide data and forecasts available concerning all aspects of the computer industry. It is on their foundation that we are initiating this historic change in the scope of the data in our Review and Forecast issues.

being scrutinized from an ROI perspective. As a result, at large sites a wider range of expertise and interests are becoming engaged in the process of formulating and acting upon IT tradeoffs.

- **In the S/370 market, PCM and secondary markets are healthy.** Given slow technology adoption rates, we believe IBM is unwilling to radically differentiate newer iterations of 3090s from older. Using advanced design tools, PCMs have proven adept at matching IBM's functional enhancements within a reasonable time frame. Moreover, to in part protect customer investments in used equipment, IBM continues to retrofit current capabilities to most-recently-shipped processor families, thereby enhancing the viability of the used market option.

The *Gray Sheet* does not expect, however, a graceful or uneventful contraction in the high-end S/370 market. Quite the contrary — competition to expand or retain market share will be fierce. This belief is predicated

Worldwide Value of Shipments Large-Scale Systems, 1985-1989

(Source: International Data Corporation, 1990)

	1985		1986		1987		1988		1989	
	$M	Mkt %	$M	Mkt %	$M	Mkt %	$M	Mkt %	$M	Mkt %
IBM Base	13,720	69.7%	14,320	65.0%	15,310	62.1%	16,880	59.8%	17,870	61.6%
IBM	12,670	64.4%	13,100	59.5%	13,500	54.7%	14,800	52.4%	15,500	53.5%
Amdahl	690	3.5%	770	3.5%	1,210	4.9%	1,440	5.1%	1,720	5.9%
Hitachi Data	360	1.8%	450	2.0%	600	2.4%	640	2.3%	650	2.2%
Non-IBM Base	2,730	13.9%	2,690	12.2%	2,740	11.1%	2,720	9.6%	2,650	9.1%
Unisys	1,610	8.2%	1,400	6.4%	1,390	5.6%	1,360	4.8%	1,360	4.7%
Cray	240	1.2%	450	2.0%	520	2.1%	570	2.0%	590	2.0%
CDC	400	2.0%	420	1.9%	420	1.7%	400	1.4%	320	1.1%
Bull HN	460	2.3%	410	1.9%	410	1.7%	390	1.4%	380	1.3%
Digital	20	0.1%	10	0.0%	0	0.0%	0	0.0%	0	0.0%
Other, Third-Party Per.	520	2.6%	560	2.5%	580	2.4%	650	2.3%	700	2.4%
US-based Vendors Total	16,970	86.2%	17,570	79.8%	18,630	75.5%	20,250	71.7%	21,220	73.2%
Non-US-based Vendors	2,710	13.8%	4,450	20.2%	6,030	24.5%	7,980	28.3%	7,770	26.8%
Worldwide Total	**19,680**		**22,020**		**24,660**		**28,230**		**28,990**	

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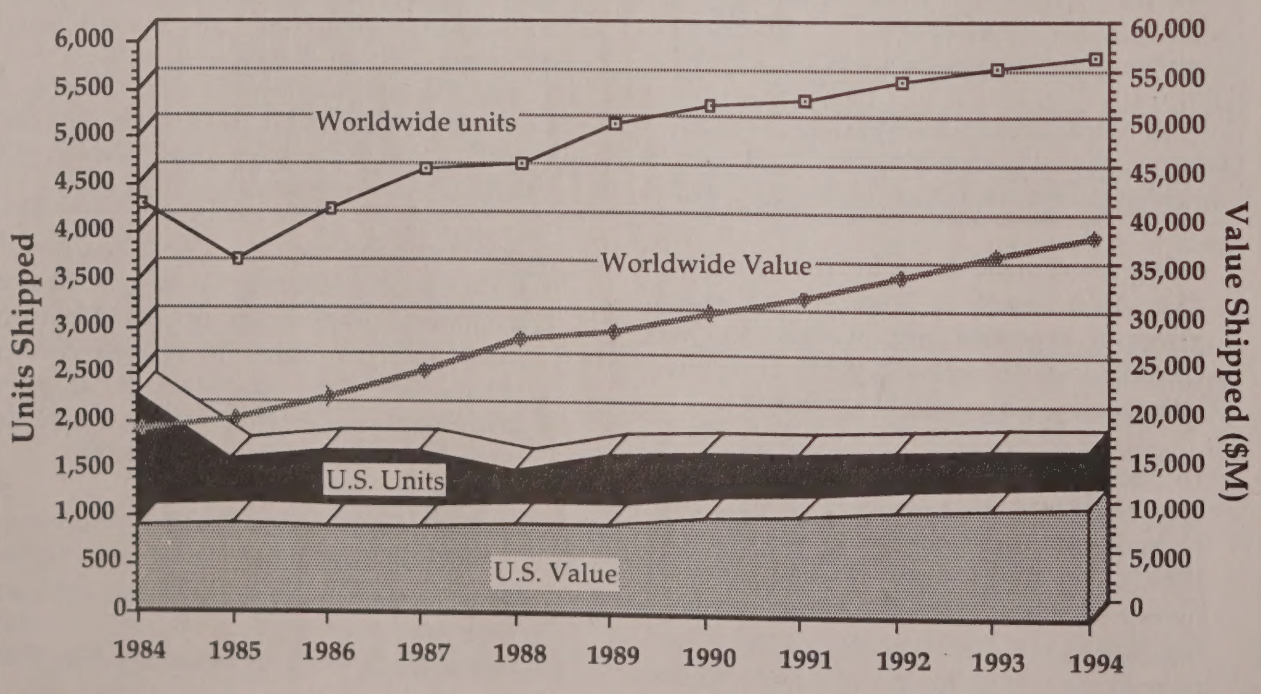
Large-Scale Systems Units and Value Shipped to the U.S. and Worldwide Markets, 1984-1989

(Source: International Data Corporation, 1990)



LARGE-SCALE SYSTEMS MARKET — WORLDWIDE MANUFACTURERS

(Source: International Data Corporation, 1990)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	Annual Growth in Value (%)
		Worldwide		
1984	4,250	19,570	18,660	NA
1985	3,670	20,870	19,680	5.5
1986	4,210	23,090	22,020	11.9
1987	4,610	24,340	24,660	12.0
1988	4,670	25,860	28,230	14.5
1989	**5,100**	**27,560**	**28,990**	**2.7**
1990	5,300	29,620	30,870	6.5
1991	5,360	31,270	32,800	6.3
1992	5,540	32,900	35,020	6.8
1993	5,700	34,400	37,190	6.2
1994	5,800	35,700	39,140	5.2
		United States		
1984	2,290	10,770	8,990	NA
1985	1,610	11,090	9,290	3.3
1986	1,690	11,920	8,880	(4.4)
1987	1,680	11,730	9,070	2.1
1988	1,490	11,280	9,330	2.9
1989	**1,660**	**11,260**	**9,430**	**1.1**
1990	1,700	11,250	10,000	6.0
1991	1,680	11,100	10,500	5.0
1992	1,720	11,050	11,100	5.7
1993	1,750	11,100	11,300	1.8
1994	1,750	11,200	11,500	1.8
		International		
1984	1,960	8,800	9,670	NA
1985	2,060	9,780	10,390	7.4
1986	2,520	11,170	13,140	26.5
1987	2,930	12,610	15,590	18.6
1988	3,180	14,580	18,900	21.2
1989	**3,440**	**16,300**	**19,560**	**3.5**
1990	3,600	18,370	20,870	6.7
1991	3,680	20,170	22,300	6.9
1992	3,820	21,850	23,920	7.3
1993	3,950	23,300	25,890	8.2
1994	4,050	24,500	27,640	6.8

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IBM's September Revamp of Enterprise Systems' Strategies to Include Summit

In the relatively mature S/370 component of the computer industry, IBM can follow three strategies to increase revenue and improve profitability:

- Accelerate turnover in the installed base by speeding up product life cycles and simplifying migration within and among processor families.

- Enlarge customers' financial commitment per site by modularizing function and pricing each component separately.

- Remove as much cost as possible from the process of servicing S/370 installed bases by homogenizing critical functional aspects across machines, operating environments, and processing modes.

The *Gray Sheet* expects that IBM in September will introduce a new era in S/370 marketing that stresses turnover, modularity, and homogeneity. The company will take aggressive action to present its S/370 products as cohesive and unified, including renaming the S/370 tribe "ES/XXX." The products and programs to be disclosed will exhibit increased consistency in hardware and software components and function, show the way for further sharing of technologies in the future, and demonstrate an expansive number of migration options and associated financial and service programs.

In addition to a number of midrange S/370 actions, the *Gray Sheet* anticipates some important mainframe-class announcements in September, including:

- Two Summit machines, one four CPU model that generates about 100MIPS, the other a 140MIPS system built with six engines. These first Summit systems will employ enhanced 3090 technology; cycle times should be nearly identical to the current J models — approximately 14.5ns. Additionally, these two models will feature a new frame, a simpler 60Hz power subsystem, and a more compact cooling subsystem similar to the closed-loop design used by Amdahl on the 5990.

- New Summit I/O technologies, including a logical configuration switch for minimizing the planned downtime required to attach DASD and other I/O devices, and fiber-optic channels.

- A new "MVS for Summit." It will be called MVS version 4.0, although the migration effort should require a release-to-release-type effort.

- New "bridge-to-Summit" 3090s that support some of the new technologies and MVS 4.0.

This will be the first unambiguous peak at IBM's flagship product for the 1990s. Next year, the *Gray Sheet* expects IBM to announce additional Summit models incorporating additional "power" technologies capable of generating 40MIPS uniprocessor performance. As with all IBM generational transitions, this is just the start, but it should be an impressive send off.

However, the *Gray Sheet* stresses that the September announcement, while introducing important new technologies, is a marketing announcement. Grand strategies are admirable, but except for providing customers with a security blanket, rarely generate revenue per se. Goods and services are what yield cash. And many of September's announced, or implied, products won't be shipping until some future date.

The near-term revenue reality is stark: the success of IBM's fourth quarter may hinge on how well it can convince the market that the 3090s with Summitlike enhancements represent the first breaths of Summit and not the last gasps of the 3090.

on a number of observations:

- **Exit barriers are very high.** Most competitors in mainframe market — both new and used suppliers — are highly dependent on mainframes for both financial and cultural reasons. Exit is perceived as, and in some cases would be, corporate suicide.

- **Product life cycles continue to dominate competition.** Volume in the mainframe market is highly dependent on the timing of product announcements. The technological complexity of such announcements and soaring competitive risks scramble market signals. Extreme competitive behavior has resulted on all sides.

- **An increasing willingness to experiment strategically.** For years mainframers followed IBM's lead. IBM, in turn, clearly established a price umbrella. Recently, Amdahl and Hitachi Data Systems, supported by strong Japanese backing, have attempted to take the lead, and in some important ways are establishing industry directions.

This last point is particularly important. There is no longer a right and wrong way for mainframe vendors. Some, like Unisys, are basically in harvest mode, fighting to defend share.

Others, like HDS, are in attack mode, fighting for a larger slice of the pie. Still others, like Digital, are operating under the assumption that they can make the pie grow. And then there's IBM that to some degree is in all modes at once.

The result is a market that looks like a bunch of old bankers performing some weird new age dance. Of course, the customer audience isn't the only group baffled by the odd ballet of the big systems. The vendor dancers themselves seem totally confused, if not perturbed, by the competitive shenanigans of their peers.

Where's the Action?

The only group that seems comfortable in their new mainframe tutus are Japanese vendors. Their mastery of component technologies is allowing them to push the price/performance state of the art. The processor family recently introduced by Hitachi Data Systems is expected to someday deliver in the range of 70MIPS per CPU.

The result is nearly a doubling of non-U.S.-based vendors' worldwide market share in the past five years. In 1985, foreign mainframers controlled about 14% of the worldwide market; in 1989, they owned just under 27%.

And although the largest drops in share were recorded by players in the non-IBM base, such as Unisys, CDC, and Bull HN, IBM was hardly immune to the onslaught. Big Blue saw its 70% share in 1985 shrink more than eight points to just under 62% in 1989.

Part of the reason, of course, is that the international mainframe market is exhibiting far stronger growth than the U.S. market. Between 1984 and 1989 the large-system business more than doubled overseas, whereas the U.S. market grew not even 5%.

This general trend will continue. Behind strong performance in Japan, the mainframe market beyond these shores is expected to grow 50% in the next five years. By contrast, during the same period the U.S. market will actually shrink. Indeed, the Japanese large-scale systems market is expected to surpass the U.S. market in size by 1994.

Conclusion

Downsizing has affected the mainframe market in more ways than stealing shipment value. Following lessons learned in smaller-systems markets, the dinosaurs are displaying an increasing willingness to take strategic risks. It's somewhat paradoxical that as the fortunes of the industry decline, the competitive action heats up.

Computer Industry News ... Computer Industry News ... Computer Industry News

Compaq's Systempro line received a boost when it released its first 486-based models. Based on the 33MHz Intel 486 chip, these models incorporate a new 512 Kbyte cache which the company claims gives the box up to four times the performance of the single-processor 386. Compaq also announced new EISA-based Deskpro models and price cuts, as deep as $3,000 on the existing 386-based Deskpro line. It maintains that its dealer channel is sophisticated enough to sell these machines and says that sales at the high end are "meeting expectations."

Sun's new retail-delivered IPC workstation/PC is a shot across PC vendors' bow. Looking more like a lunchbox than pizza box, it could cannibalize Sparcstation sales, but not for long. Look for Sun to introduce SS-II in early fall to maintain performance improvements in the $10-12K band.

IBM's John Akers had to publicly restrain Wall Street traders who helped its stock up to $122.375, its highest level in eighteen months, after release of IBM's second quarter results. The results themselves showed a 5.2% rise in second quarter net income on an 8.4% revenue gain, but Akers warned of problems in the year ahead. Mainframe orders, which are typically up in the second quarter, were flat from Q1 and could slow down even further while customers wait for the Summit announcement. The good news came from leasing and software — software revenues rose 26%.

Apple on the other hand saw its stock fall, despite reporting revenues up 9.3% on the same quarter last year. It warned analysts that its operating earnings in the fourth quarter may be below those posted a year ago, as anticipation of new products delays orders.

A technology licensing agreement with Outbound, and a decision to abort Claris public offering highlighted other developments in Cupertino. Apple quietly acknowledged a smaller, better way to portability by signing the Outbound deal. It lets Outbound continue selling its portable and Apple use some Outbound technology, by way of a circuitous license agreement, but is unlikely to produce co-developed products. On the software side, Apple — recognizing the true threat from Redmond — prefers to keep Claris as an in-house resource. Not so "personal intelligent communicators" though. These mysterious items will be the product of General Magic Inc., which Apple is spinning off to develop flavor-of-the-month notebook computers which recognize handwriting.

"Anti-Japanese hyperbole" is what Kubota executives believe is behind the industry's most bizarre story. Allen Michels and Matthew Sanders, both former co-chairmen of Stardent, have filed suit in a California court alleging that Kubota used its $95 million equity in Ardent to force the merger with Stellar, drain away its key personnel, technology and distribution network and allow Stardent to fail. Apparently, Michels and Sanders wrote to Kubota demanding what amounts to $7 million hushmoney, and when this was refused became enraged at what they see as the undermining of American technology. Not to mention the reputation of the American legal system if this case gets anywhere.

In the UK, however, a threatened storm over the proposed majority shareholding being taken in ICL by Fujitsu of Japan never really materialized. The Labor Party indicated a greater concern about British software companies falling into foreign hands — a reference to the Hoskyns takeover by Cap Gemini Sogeti, because "software is the wave of the future." The government felt the deal was simply a private transaction and had nothing to do with the national interest. All in all, its a long way from the row over foreign takeover of Westland helicopter last year which led to the resignation of two Cabinet ministers.

SERVICES/DISTRIBUTION REVIEW & FORECAST

THE GRAY SHEET
Computer Industry
REPORT

D.B. McLeod, Editor | JULY 6, 1990 • VOL. 25, NO. 23 | *Published Continuously Since 1964.*

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Vendors Turn to Services to Augment Slowing Hardware Sales, Customer-Support Growth

Hardware manufacturers have been lip-synching the service-is-an-opportunity line for years. Now it's a lifeline.

Service business, as a corollary to hardware sales, has traditionally been a steady source of income. Particularly when hardware sales growth slowed. Management looked to services for a high-margin kick to increase net income.

But now paltry industrywide growth rates are producing two fundamental shifts in the concept of service. Traditional hardware maintenance — the high-margin staple of the past — is unfolding into a host of related support services. And traditional service providers are diversifying into services aimed at offloading or streamlining data center management.

The competitive emphasis on higher-margin "services" products is a response to two trends:

- **Hardware revenue doldrums continue.** Worldwide hardware spending will increase in the 6-10% range into the 1990s. Companies used to double-digit growth rates need to look beyond boxes.

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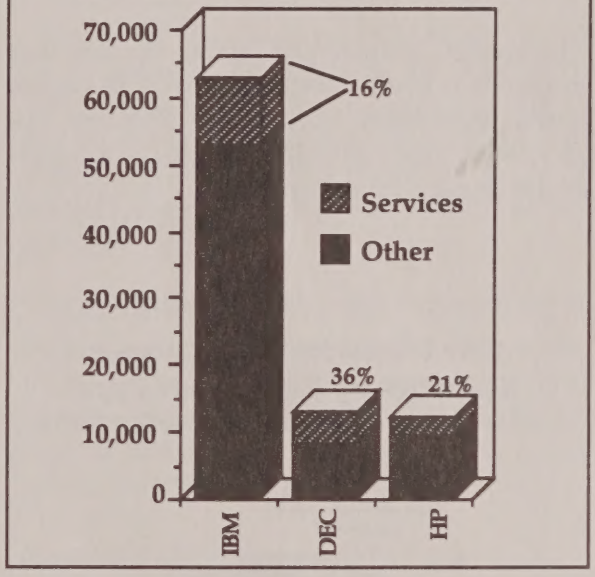
Digital, HP and IBM Services and Other Revenue, 1989 ($ Billions)
(Source: IDC, Annual Reports, 1990)



- **Remedial support services aren't faring any better.** Hardware and software maintenance and support was a $19 billion dollar business in 1989. Thanks to decreasing MTBF rates as well as technologies like predictive maintenance and self-diagnostics, it is growing only marginally faster than the overall industry.

As a result, new growth opportunities lie outside the traditional remedial maintenance realm. Instead of repair, hardware vendors now offer "support." Instead of rigid "our-equipment-only" policies, vendors now tout "customizable, multivendor" hard-

IDC INTERNATIONAL DATA CORPORATION
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ware and software partnerships that include services like installation, training, and servicing other people's hardware.

And companies that specialize in selling services — indirect channels players, third-party maintainers (TPMs) as well as hardware vendors — are scrambling to identify specific functions which assist in the management of data centers.

These typically include professional services like systems analysis and site planning, and other services such as disaster recovery and network integration. Each is aimed at allowing users to focus on their core businesses, not on becoming computer systems gurus.

However, competition under the services umbrella is keen. Providers converge on potential customers from many different angles, with many different products. Consider this competitive scenario:

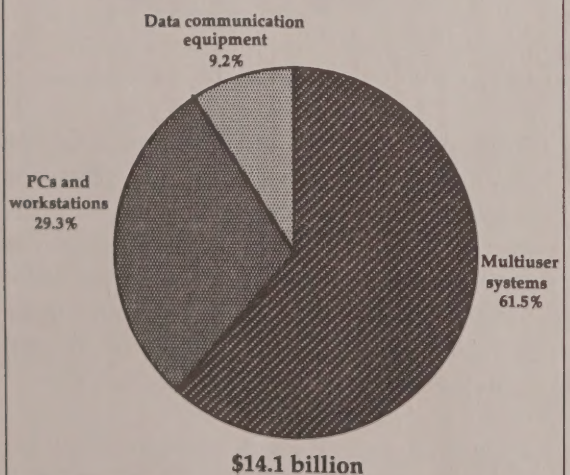
- IDC expects that in 1990 less than 50% of revenue derived in U.S. midrange and single-user systems markets will be direct-sales hardware (see p. 6). As a result, manufacturers selling services increasingly compete with channels that know more about customers' needs than the manufacturers themselves.

- The services balance of power has shifted from provider to user. Users increasingly expect systems from dozens of different vendors, and software from who-knows-how-many sources, to be supported by a single provider. And they know how to leverage other service vendors' products into more favorable terms.

- The strategic implications of a successful services business are huge. As systems integration continues its assault on commercial markets (see p. 6), vendors recognize that getting a foot — or at least a good software technician — in the door often leads to other opportunities. Mak-

1989 Hardware Maintenance Revenues by Equipment Type

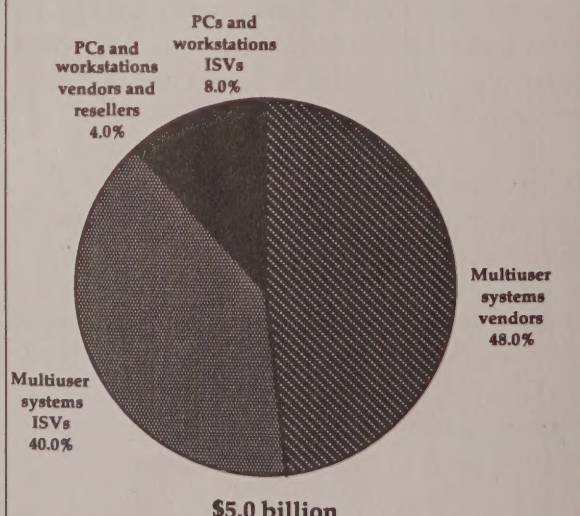
(Source: International Data Corporation, 1990))



$14.1 billion

1989 Software Support Revenues by Provider

(Source: International Data Corporation, 1990))


PCs and workstations ISVs 8.0%
PCs and workstations vendors and resellers 4.0%
Multiuser systems vendors 48.0%
Multiuser systems ISVs 40.0%

$5.0 billion

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ing a suite of services a loss leader is one way of getting in, but only at the expense of margins.

Why the Shifts?

Vendor interest in services is growing. But in some ways the shift toward vendor-provided services goes against common wisdom.

Decentralization and downsizing are today's strategic mandate. Put computing power in the end users' hands, current thinking goes, and development backlogs will be cut by letting them point and click their way to simplified, low-cost applications and solutions.

Isn't the emergence of another layer between end users and iron — in the form of professional services contracts or system integration routines — anathema to downsizers? Not necessarily. Two possible explanations:

- In some cases, outsourcing simply provides a low-cost way of phasing out the data center. The rise in services which offload from data center management is merely an evolutionary step in the rise of scaled-down IS organizations.

- Many users are answering the strategic question "How important is IT expertise to my business?" with a resounding "Not very." They have made the decision that farming out services — and eschewing the accruing of IT expertise — is no big deal.

Vendors are wedging themselves into the middle of the data-center/end-user computing chain. They're trying to be all things to all users, and in so doing, challenging conventional "power-to-the-desktop" wisdom.

Repair to Professional Services: Three Decades of Change
(Source: International Data Corporation, 1990)

1970s Maintenance	1980s Customer Service	1990s Services
Remedial services	Remedial services	Operational services (offloading from internal staff)
Hardware oriented	Hardware and software oriented	Network oriented
Specific terms and conditions	Menu of offerings	Customizable
Own equipment only	Multivendor hardware support	Multivendor coordination

However it's done, in all corners of customer support flexibility is the way of the 1990s. Vendors seeking to augment flattening hardware revenue growth are finding that merely identifying "services" as a potential alternate revenue stream is not enough.

These companies are now scrambling to build a portfolio of *expertise* that can be used to manage customers' transitions. And, equally important, vendors are wildly trying to determine how much users will spend, and how to make them spend it.

Remedial Maintenance Is Out

The billion-dollar service businesses of leading systems manufacturers were typically gained against few competitors. Remedial service traditionally carried huge margins. System vendors banked on a steady stream of low-cost service revenue to boost profits.

Beginning in the early '80s, the high service margins attracted new support providers: third-party maintainers. The TPMs provided remedial hardware maintenance less expensively — and less dictatorially — than system vendors.

Multivendor PC Support: Still a Ways to Go?

IBM, Digital and HP have each rolled out, within the last two years, PC and LAN software and hardware support programs designed for Fortune 1000 customers. That prompted an IDC Customer Service Program survey to determine whether large PC users really need a broad PC software support product. The interviews — with a cross section of F500 users — indicate they very well may not.

Large corporate users have valid concerns about the level of technical expertise each support vendor will have on such broad ranges of software packages as they claim to support. The crux of their support needs lies in *integrating previously purchased software into a seamless solution,* not just in supporting individual packages.

In addition, respondents also indicated that vendors are not addressing the need for *application consulting and advising* before purchases are made, and before any support and hand-holding is required. Vendors enjoy saying to prospective (large-, medium-, and small-scale) system — and PC — customers, "Just call when you have any problems." But it sounds as if they're not really hearing what customers need from support providers.

By 1986 hardware manufacturers were fighting back. IBM introduced new customer service agreements which triggered vicious competition and drove prices to artificially low levels. Service margins all but evaporated.

As a result, the race is on. Vendors are now attempting to identify what "services" customers want. And they're racing to figure out how much a custmer is willing to spend. Then, finally, they're trying to determine how to actually get the expertise out the door in an easy enough way to turn a profit.

Services, the Word at IBM

DEC, HP and IBM are most obviously affected by each of the shifts because of their huge service businesses. IBM has the most to lose — or gain — depending on how aggressively it moves to transform itself into a services-, customer-oriented competitor.

Over the course of the last 18 months IBM has raised hardware maintenance prices, unveiled a supposedly easy-to-use "menu" system for ordering IBM service, initiated a multivendor PC software support program, expanded end-user support programs and stepped up its facilities management program with the creation of a System Services Group responsible for high-visibility outsourcing contracts.

It is attempting to embrace the challenges of shifting services. The net result — broadened, more reliable revenue bases — brightens IBM's short- and long-term prospects.

1989 Professional Services Revenue ($ million)

Electronic Data Systems	$2,750
IBM	1,040
SAIC	631
Unisys	540
Computer Sciences Corporation	473
Andersen Consulting	472
Systemhouse	366
Emhart (PRC & ATI)	360
Ernst & Whinney	315
Coopers & Lybrand	290

1989 Systems Integration Revenue ($ million)

Andersen Consulting	$1,656
Electronic Data Systems	1,634
Boeing Computer Services	1,331
IBM	1,268
Unisys	429
Computer Sciences Corporation	407
McDonnell Douglas Information Systems	344
SAIC	264
Martin Marietta Data Systems	212
Emhart (PRC & ATI)	203

Systems integration is a service by which vendors provide a comprehensive information processing solution through a unique combination of professional services and expertise in hardware, software and communications technologies. The prime contractor maintains full financial responsibility for the entire project. **Professional services** are procurements obtained on a customized or contractual basis for system/software development, system design, integration and installation, associated DP-only consulting and training. ***(Source: International Data Corporation, 1990)***

Where to Draw the Line

But diversification and vertical integration can only take a company so far. Distinctive competencies become diluted when any company loses focus on its core markets and key competitive capabilities. Any company attempting to be all things to all people eventually suffers.

Because of its relative youth, few other industries provide the range of opportunities as computers. Markets are still being defined. Revolutionary innovation is still possible. The question is, does such youth allow for the success of a single strategy founded on tactics ranging from retail sale of home computers to system integration contracts totaling billions of dollars?

Transportation and Information Technology

(Source: International Data Corporation, 1990)

Transportation	Information Technology	Traits
	Consumer sector	
Bicycles	Games/handhelds	Dealer channel
Motorcycles	Laptops/portables	High volume
Cars	PCs/WS	Marketing/image
	Industrial Sector	
Airplanes	Mainframes	Direct sales
Trucks	Minis	High value-added
Rails	Supercomputers	Big buy & add-ons
Ships	Specialty Systems	Reputation
	Services Sector	
Airlines	Online databases	Adv. automation
Car rentals	Professional services	Customer focus
Parts, Maint.	Maintenance	People intensive

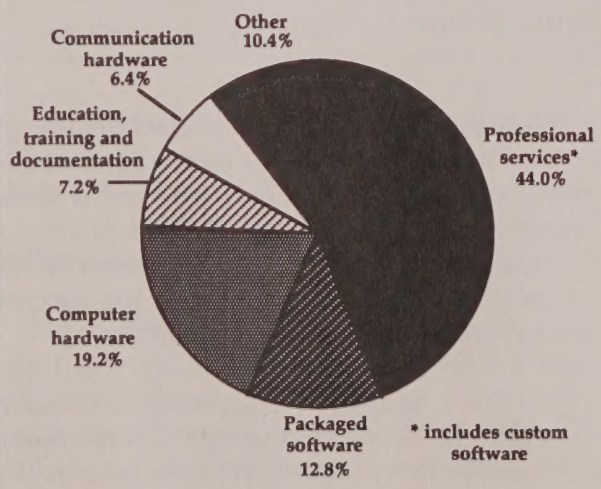
Cars and Computers

Comparing the computer industry to the automobile industry has become voguish. A more valid comparison — to transportation in general — sheds light on diversification and competition trends.

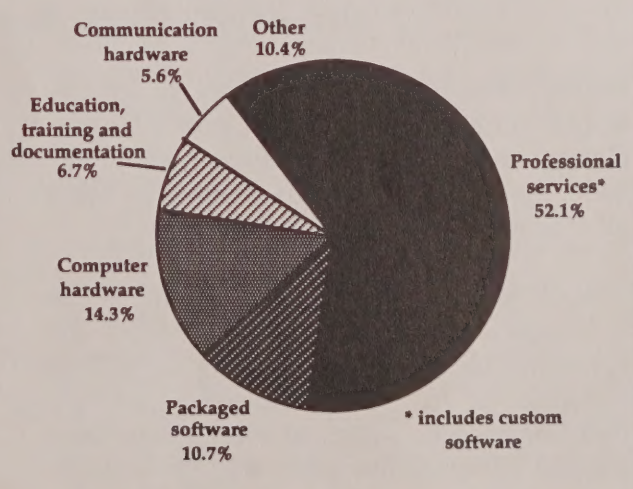
Competition in three broad horizontal segments — consumer, industrial, and services — is roughly analagous across the two industries (see above chart). But that's where the similarity ends.

In the older, more mature transportation industry, no single company competes in each sector. In the younger, less-mature computer industry, however, significant players are attempting to bridge across all three sectors. The recent, increasing focus on services is a continuation of that bridge.

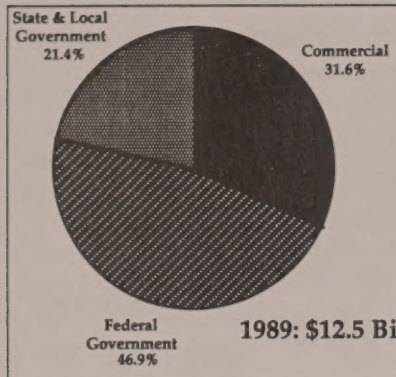
1989 System Integration Revenue by Service



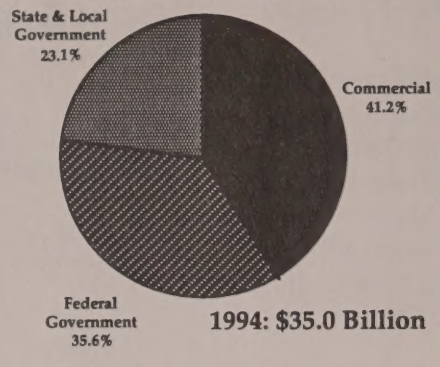
1994 System Integration Revenue by Service



(Source: International Data Corporation, 1990)



1989: $12.5 Billion



1994: $35.0 Billion

Commercial system integration contracts are expected to grow to over 40% of total 1994 SI market.

(Source: International Data Corporation, 1990)

The basic difference between the two is not wholly attributable to age. Individual travelers don't purchase tickets from Boeing or Lockheed. They usually don't even purchase tickets from carriers, although that's an option. More often, a structured delivery channel — travel agents and ticket brokers — provide custom solutions for both frequent and infrequent flyers. Likewise, neither Schwinn nor Kawasaki seek to expand into industrial transportation.

Integration is the key. It's easy to take a Schwinn to the bustop, hop on a Greyhound to the Avis terminal, drive a rented Chevy X-car to the airport and then buy a ticket from the Sabre reservation system on Pan Am, or another carrier that flies Boeings or Airbuses.

But integrating computers is a little harder. Just ask the standards-making bodies. Taking data or applications from PCs to across networked servers and into the mainframe demands integration expertise.

The danger is the potential weakening of competitive position. Digital, HP and others compete in two of the three sectors, IBM and Unisys in all three. While each sector demands different skills and assets, distinctive competencies have — as of yet — not been diluted.

Distribution in Flux: Hardware Sales to Comprise Less than Half of 1990 Non-Mainframe Revenue

Selling computer systems used to be, reduced to its most basic form, pretty simple. Design and build the hardware. Write the code. Load it up and ship it out. But that's all changed.

More than half of all 1990 revenue in the midrange and below — two-thirds of the computer industry and growing — will be software or third-party added value. As downsizing rolls along, an even greater proportion of hardware sales will go through indirect channels, driven by higher-than-average low-end growth rates.

With regular price/performance leapfrogging — and with standardized, open architectures moving to the forefront in the midrange — channel management has become a critical differentiating factor between hardware manufacturers in all but the largest size classes. Consider these points:

- Indirect business is growing far faster than the industry average. Value-added reseller (VAR, see definitions next page) channel shipments for small- and medium-scale systems increased 22% from

1986 to 1988, while the total market for those systems grew less than 3%. Direct sales in those segments decreased 7%.

- Composition of indirect channels is changing. The number of small- and medium-scale VARs dropped from 52% to 35% of the total VAR population. Workstation and PC VARs increased from 48% to 65% of the total.

- Even IBM is paying attention to indirect channels. It was responsible for 55% of VAR channel growth in the midrange with approximately 4,500 AS/400s moving through its VAR program in 1988.

- Growth markets are moving to indirect sales channels. While direct sales remain dominant in the Unix market, VARs have increasing influence. They move approximately 40% of systems and account for 20% of revenue.

Value added resellers (VARs) are nonretail, nonmail-order sales organizations which take title of products, add tangible value, and then resell the products to end users or the next tier of distribution.

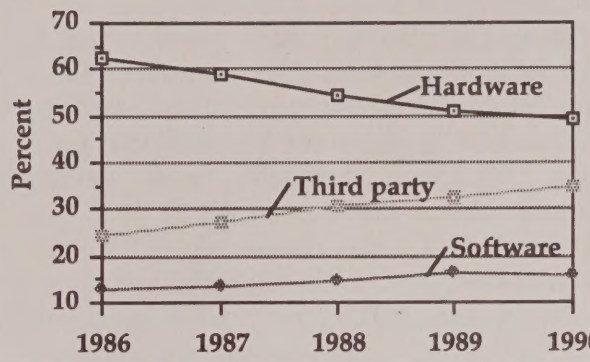
Original equipment manufacturers (OEMs) resell other vendors' systems under their own label without adding substantial value. An OEM typically specifies some portion of the manufacturing process for its own (possibly unique) requirements.

The rapid expansion of indirect sales channels poses a single challenge to system vendors: reduction of channel conflict.

Managing Multiple Tiers

Successful multiple channel strategies are built around value-added distributors and master VARs — middlemen in the channel equation. Vendors focus on three areas: account control, shifting of marketing and technical support, and channel coverage.

The Decline of Hardware's Proportion of Non-Mainframe Sales 1986-1990
(Source: International Data Corporation, 1990)



Account Control

Retaining account control — over both large direct and small indirect customers — is key, for at least two reasons. First, vendors have complete information on the range of solutions available in the marketplace. Second, vendors can measure new business generated by particular VARs or distributors.

Shifting Support

Several vendors also reward distributors or master VARs for providing sales, marketing, and technical support to their customers. Decreasing the demand for support from vendors allows them to pursue other opportunities.

Channel Coverage

Clearly defined channels reduce the possibility of channel conflict. Most vendors limit to one the number of tiers that might sell to a specific segment of end users.

Summary

IDC's Distribution Channels Program expects midrange sales through indirect channels to continue increasing — at roughly double total segment growth — while direct sales flatten. The percentage of PCs moving through the retail/dealer channels, however, will decline due to growth in the consumer channel.

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PS/1 is everything Junior wasn't. And at the analyst briefing, Entry Systems Division VP James Cannavino had the Mr. Rogers sweater to prove the International Business Machines company was getting serious about the home. While IBM has clearly done a lot of homework — the PS/1 is well-designed, well-researched, and excellently-packaged — the channel questions still bother us. Many dealers bitterly remember the loss of Junior sales to heavy discounters. By signing up two types of dealers for the PS/1 — existing PS/2 dealers and new mass merchants like Sears — IBM threatens to alienate its higher-end dealers, nearly all of whom have a higher cost structure associated with their expertise. They envision — fear — spending lots of pre-sale time with potential customers who go down the street to the heavy discounts at Sears when time comes to buy.

IBM has shipped 1,000 RS/6000 systems so far, but IDC still expects 1990 shipments to total approximately 15,000. Bookings are running 57% workstation, 35% multiuser, and 8% LAN or server. The Santa Palumba, Italy, plant will help 3Q90 volume shipments. IBM has taken great steps to say that AIX 3.0 wasn't intended to meet General Availability status until recently. Solid code wasn't shipped until four weeks ago. Nextstep is not doing well. Surprise.

HP reduced its workstation overlap, leftover from the Apollo acquisition, with a new line of 68030 and -040 systems. They run either Apollo's or HP's Unix, though each requires different keyboards and disks. While the new systems are price/performance competitive with Sparcstations, a poor third or fourth port — behind new DEC and IBM RISC boxes — won't cut it.

Five RBOCs misallocated lobbying expenses to operating expense accounts in 1989. Ameritech, BellSouth, Nynex, PacTel, and Southwestern Bell wrongly passed on several million dollars worth of lobbying expenses to phone company customers; this year's budget for convincing Congress to ease MFJ restrictions comes to $3 million apiece.

Canon to market NeXT workstations in Southeast Asia. Since last September it has shipped less than 1,000 units in Japan; it is aiming for monthly shipments of 200 units.

MITI will invite non-Japanese firms to participate in the upcoming "micro robot development" project which starts next year. However laudable, negotiations between MITI and non-Japanese firms are not always smooth. The non-Japanese firms are generally less than eager about contributing profits generated from the shared research with the Japanese government, and typically have a hard time with Japanese technical publications and accounting systems. Understandable but hardly a barrier, we hope.

Self-repairing integrated circuits developed at the IBM Watson Research Center track down and patch defects, without affecting other parts of the IC.

HP is testing a toner cartridge recycling program that benefits two major environmental groups: the National Wildlife Federation and the Nature Conservancy share a $1 donation from HP for every returned cartridge. DuPont has identified two potential alternatives to halon fire extinguishants. Neither has appreciable ozone-depletion potential compared to halon.

MIDRANGE REVIEW AND FORECAST

THE GRAY SHEET

Computer Industry REPORT

D.B. McLEOD, EDITOR | VOLUME 25, NUMBERS 21 - 22 | JUNE 14, 1990

"Product cycles are no longer cycles ..." See page 7.

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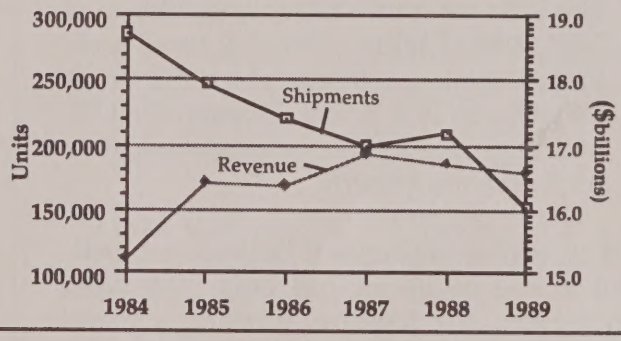
Beyond Maturity: The Evaporation of the Midrange

Last year's midrange market performance was, generally speaking, a disaster. Unit shipments plummeted. Revenues sank. Vendors scrambled to retain market shares. Managements executed repositioning and cost-cutting unparalleled in the history of the industry. Even Digital, the king of the midrange mountain-turning-molehill, was not left unscathed.

Midrange death notices were splashed across business pages on both coasts. Analysts holding out hope for the three-tiered computing model became a dying breed. But, despite the bad news, small and medium-scale computer systems still comprised a $16 billion business in 1990.

Our most recent examination of the midrange (*GS* 24:11-12, Dec. 9,1988) took special stock of the intense competition in the midrange. It noted how competitive pressures were increasing to furious levels, and disintegrating traditional computing boundaries between the glass house and the desktop.

Worldwide Midrange Revenue and Shipments (Small- and Medium-Scale Systems), 1984-1989
(Source: International Data Corporation, 1990)



At that time we stated the midrange was entering perhaps the most critical period in its history. Twenty years of shipments — characterized by highly regular five-year growth spikes followed by four years of lower growth and retrenchment — suggested the midrange was poised for recovery in 1989.

However, with language like "phase-change" and "discontinuity," we predicted that 1989 would prove to be the year in which the midrange would fail to deliver on its scheduled upturn. The pressure-cooker conditions of the midrange were, we felt, threatening to break the pattern. And only those vendors willing and able to identify and adopt new patterns of competitive behavior would survive.

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By and large — and sadly for vendors in the midrange — we were correct. No recovery materialized. In fact, 1989 was one of the worst midrange years in memory. We note the following market results:

- Shipments in the medium-scale segment of the midrange (IDC, publisher of the *Gray Sheet*, is slightly altering class size definitions. See p. 6.) dropped 17% (4,000 units) while small-scale shipments plummeted 29% (54,000 units) in the U.S. from 1988 levels. In neither case could shipment volume compensate for retirements. The U.S. installed base in both segments shrank in 1989.

- Shipment value fell far less dramatically. The U.S. medium-scale market dropped 3.0% to $8.15 billion. The U.S. small-scale market managed to eke out a miniscule 1% gain, to $8.4 billion. Overall, the U.S. midrange market experienced negative 0.9% revenue growth.

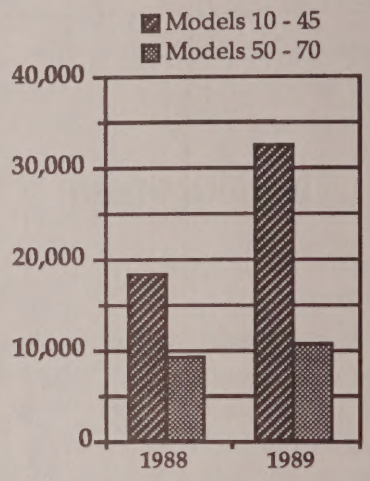
Why such a nightmare? Because competition in the midrange has only intensified since 1988. The tensions effecting a phase change in midrange market conditions still obtain. The stress from all sides continues to mount. To summarize:

- From below, PCs render office timesharing obsolete. Local area network (LAN) -based applications siphon sales away from traditional midrange systems.

  The single most important factor in the small-scale shrinkage was the rapid growth of Unix multiuser PCs — nearly 100,000 were sold in 1989.

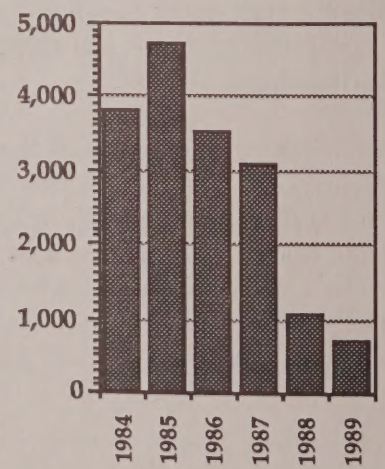
- From the sides, general-purpose minicomputer vendors cannibalize markets with vicious price competition.

Worldwide IBM AS/400 Unit Sales, 1988, 1989



Worldwide IBM 4381 Unit Sales, 1984-1989

(Source: International Data Corp., 1990)



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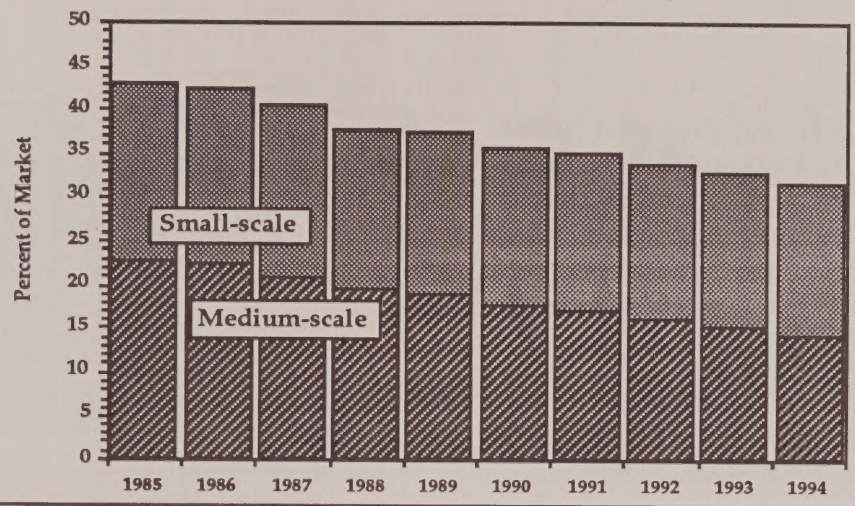
The Midrange's Decline of Total Worldwide Hardware Spending, 1985-1994

(Source: International Data Corporation, 1990)



- From within, customers demand higher quality solutions at lower prices.

- From above, the mainframe not so much encroaches as simply sits, a ponderous lid capping and containing movement upward.

Is the phase change complete? Not likely. Has the midrange congealed into a new structure, crystallized around the concept of network computing and the process server? Not yet. Has it reached the flashpoint, to now sit on the verge of evaporation? Very possibly.

But before we proclaim 1989 as the beginning of the end of the midrange — when real installed base began to decline — we note two other factors which likely contributed to the midrange malaise: Digital and IBM. Midrange markets are driven by their behavior. And neither had 1989's befitting market leaders.

- Successful by other measures (to the tune of over 40,000 systems worldwide in '89), the AS/400 still failed to live up to IBM's aggressive goals for the year. Within 18 months of the AS/400 introduction, almost one-third of S/38 sites had upgraded to the AS/400, but that paced slowed considerably.

- IBM was caught red-handed trying to convince 4381 customers to step up to more expensive and profitable 3090 processors. But by stressing that migration IBM was forced to stretch the 4381 into a fifth year with no replacement. And the lack of a 4381 replacement stalled medium-scale purchase plans for all makes of equipment. Besides ... five-year life cycles in the midrange? Get serious, IBM.

- A 225% performance leap in the VAX 6XXX was unable to significantly increase sales from 1988. Under 6,500 VAX 6XXXs were shipped during 1989, well below company projections.

As IBM and Digital languish, so languishes the midrange. The question then becomes, will strong product announcements in the second half of 1990 revivify the midrange? And the answer is no.

(Continued on page 6)

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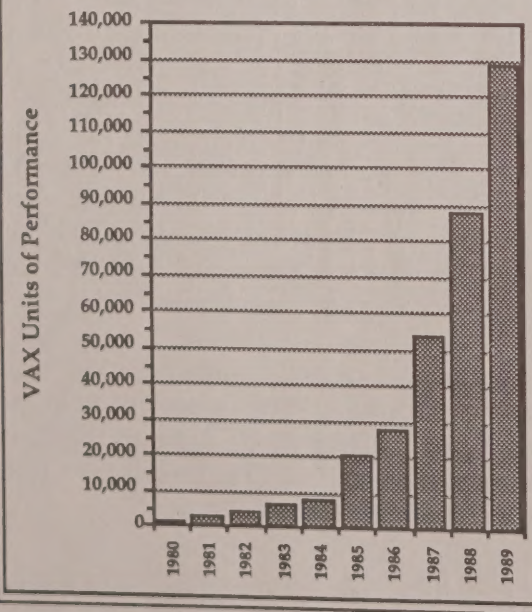
Downsizing at Digital:The Case of the Shifting VUPs

Many of the vexing problems in the midrange can be illustrated by examining Digital Equipment Corp., the archetypical minicomputer vendor. We have found that one of the most useful metrics for evaluating Digital's hardware history and prospects is the changing dynamics of VUPs (VAX units of performance — what we used to call VAX MIPS, the performance equivalent of an 11/780) shipped and installed by VAX product family and IDC size class.

In 1989, only 3% of VUPs were accounted for by the aging VAX 8XXX line, while 16% came from its new successor, the 6000s. Meanwhile, wholly 81% derived from MicroVAX systems, including the new 3000s as well as the older MicroVAX II and 2000 lines.

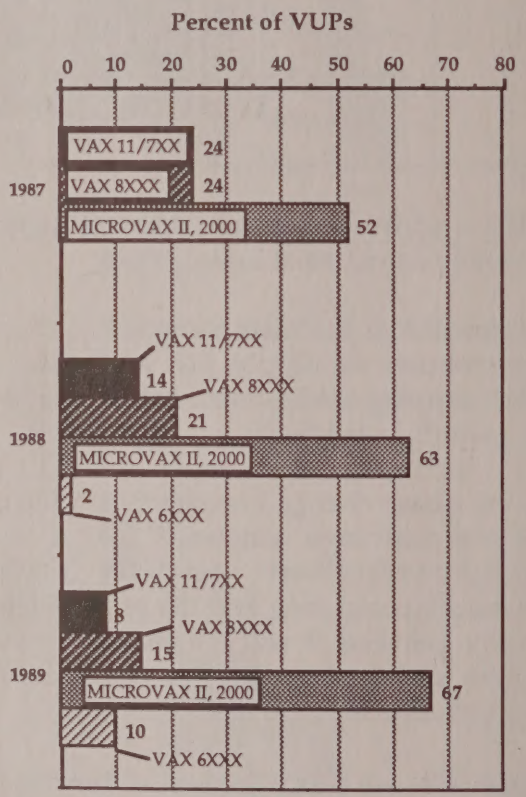
VUPs Installed in the United States, 1980-1989

(Source: International Data Corporation, 1990



Proportion of United States VUPs Shipments by Product Family, 1987-1989

Source: International Data Corporation, 1990



The same preponderance of microprocessor-based VAX systems has also asserted itself in the U.S. installed base, where by the beginning of this year they represented 68% of the VUPs installed in the United States. In other words, over two-thirds of the potential work that can be ac-

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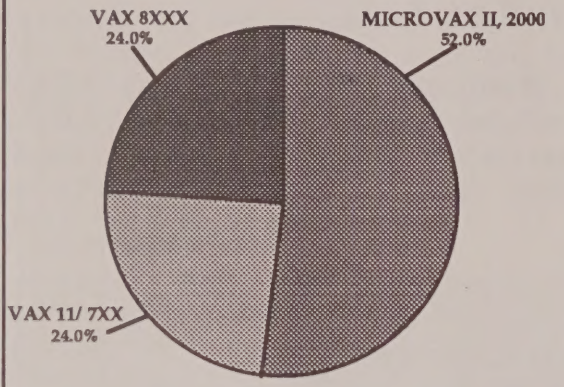
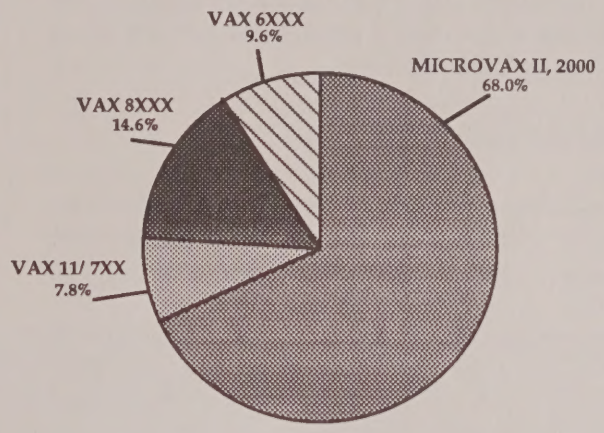
VUPs by Product Family, 1987
U.S. Installed Base
(Source: International Data Corporation, 1990



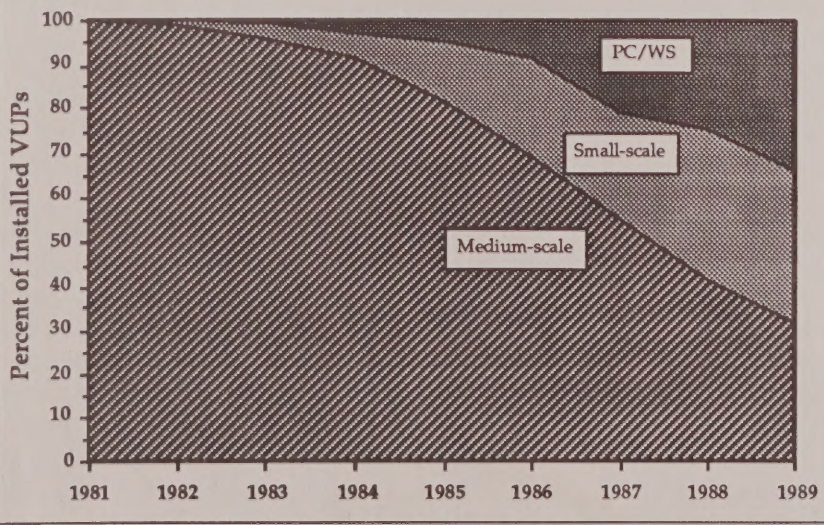
VUPs by Product Family, 1989
U.S. Installed Base
(Source: International Data Corporation, 1990)



complished on all VAX products in the U.S. would be on MicroVAX products.

Therefore higher and higher proportions of VUPs do users' work on cheaper and cheaper systems. Until 1982 all VUPs shipped were on medium-scale systems. As recently as 1985 two-thirds of the VUPs shipped in the United States were medium-scale, and only 8% were on workstations. But in 1989, less than a fifth were on medium-scale, over a third were on small-scale, and fully 45% were on workstations. As a result, by the beginning of 1990, the proportion of U.S. VUPs installed on medium-scale VAX systems, small-scale VAX systems, and VAX workstations were almost exactly complete.

Proportion of VUPs Installed in the United States by Size Class, 1981-1989
(Source: International Data Corporation, 1990



From 1979 to 1984, the number of VUPs installed in the U.S. more than doubled almost every year. Over the next five years, the CAGR of all U.S.-installed VUPs remained strong at 70%, with a 1989 growth equal to the five year average. However, U.S. medium-scale VUPs grew only 29% in 1989, while small-scale VUPs expanded 76% and workstation VUPs mushroomed at a 133% rate.

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The lesson to be learned from the VUPs migration discussion (see pp. 4-5) is that even the most successful midrange vendor of the mid-'80s is caught in the same vise as its competitors — trapped in what is becoming a no-man's land between the glass house and the desktop.

Gloomy and Worsening

Looking forward, we do not anticipate major changes in the market forces that shaped 1989. New introductions by Digital and IBM will be unable to spark the midrange to life. The 1990 market will likely be flat compared with 1989, with a few more points shaved off medium-scale and a few points added to the small-scale.

VAX 6000 Notes

Shortly after Labor Day we expect Digital to debut the VAX 6000 Model 500, a fourth-generation platform. The one to six (or possibly eight) 12-VUPs CMOS3 CPUs and

(Continued on page 10)

Changing Definitions for a Changing Market: IDC Redefines Medium- and Small-Scale Systems Classifications

In the early 1980s, when the current size classifications were established, the boundary between small- and medium-scale systems was fixed at 16 users in an average configuration in a typical commercial environment, and, between medium- and large-scale, at 128 commercial users.

Over the years, the performance capabilities and the number of available slots in midrange systems have vastly increased, and with them vendors' claims for "maximum" users, whether active, potential, or established by an unstated criterion in unspecified application environments. Our feeling was that, in most cases in the past, increased MIPS were absorbed by increased workloads for established or new applications rather than by a greatly increased number of users, and that sites approaching the maximum number of available connections were exceptions that did not have a major impact on the overall average.

Research bore out these assumptions. Last year, however, we decided that, due to the increasing capabilities of today's microprocessors, it was once again time to test the number-of-users element in our definitions against available data. The test would be the same employed in the past: the number of terminals in the U.S. data file, now maintained by IDC's sister company, Installed Technology International.

The results validated the existing boundary between medium- and large-scale systems, but suggested that the small-scale/medium-scale systems line should be moved from 16 to 32.

The upper boundary has to be moved because the average number of users on a typical small-scale system in the U.S. is now 12-14, apparently due to two phenomena: (1) the increased performance of today's commodity and proprietary microprocessors is luring users from more expensive medium-scale systems, an aspect of downsizing that is reflected in the weak performance of the medium-scale market in the U.S.; and (2) PC LANs and Xenix-based PCs running several terminals are siphoning off a significant portion of the low-end (2-4 user) small-scale market.

In the meantime, there has so far not been a comparable increase in the movement of users out of the glass house into medium-scale systems. The maintenance of the 128-user boundary between medium- and large-scale systems therefore can also be viewed as a reflection of the ongoing difficulties experienced by many vendors in the medium-scale market.

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Quotations from Chairman Ken

by Terry C. Shannon, Director - Digital Advisory Service

Recently the entire Digital senior product management team presented DEC's strategic agenda for the 1900s to industry consultants and analysts. Highlighting the event was an informal presentation by DEC president Ken Olsen. Herewith is IDC's Digital Advisory Service summary.

The U Word, Yet Again

It has become axiomatic that any Ken Olsen speech, regardless of its topic, theme or target audience, will include at least one potentially controversial reference to Unix. This was no exception.

"A year ago I said that we're committed to commercial Unix. Now I'm not so sure." So opined Olsen in an observation that could again imperil Digital's open systems environment — just when the firm thought it had dispersed the last vestiges of a persistent Unix-as-snake-oil-slick with Ultrix Version 4.0 "software surfactants."

According to Olsen, retrofitting Unix with the capabilities and complexities of a commercial operating system is an undertaking that would transform a simple, uninhibited software environment into one encumbered by baroque complexity. "Unix is a beautiful thing for what it is, but the basic part of Unix was not made for large-scale commercial systems," Olsen said, adding that "commercialization would make Unix lose what we love it for."

But before Digital scrambles the Unix damage control team, and before users start doubting the firm's Unix strategy, several points. First and foremost, Olsen was questioning the role Unix can be expected to play in the commercial environment when VMS-based systems achieve performance parity with Unix-based systems. Olsen's contention that platform parity will be a near-term development is underscored by his statement that "VMS machines soon will be as fast as those that run Unix." Olsen hinted at VMS parity with RISC/Ultrix hardware, but we were surprised by his casual reference to a "RISCy VAX." Implicit in this statement are radical changes for the VAX architecture: as dinosaurs evolved into birds, so may the Vaxosaurus evolve into an advanced hardware platform which could bear an avian sobriquet such as Eagle.

Secondly, Olsen was reiterating his contention that the academic roots — and relatively uninhibited growth — of Unix render it less suitable for commercial applications than an operating system whose architecture and design are predefined and highly structured.

Back to Retail?

On the low end, it appears increasingly likely that Digital will expand its sales efforts with a return to the retail trenches. According to Olsen, "The likelihood is that we'll do it real soon." The most likely site would be Tandy's network of business-oriented computer centers.

Of Profits and Production

Regarding the company's less-than-stellar FY'90 financial performance, Olsen stated that the emergence of technology and time-to-market as key elements in the competitive strategy equation has rendered obsolete the traditional product life-cycle as a barometer of corporate well-being.

"Product cycles are no longer cycles, instead there is a steady flood of new products," Olsen explained. "Consequently, our products are tied to more than products." According to Olsen, profits are also subject to the vagaries of the economy and to industry trends. Olsen claimed that trends are the least predictable component of the equation, citing successive waves of interest in personal computers, and workstations — and what seems to be a resurgence of support for mainframe systems.

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Small-Scale Systems Market, 1984-1994

(Source: International Data Corporation, 1990)

Year	Unit Shipments	CAGR	Installed Base	Shipment Value ($M)	CAGR
			United States		
1984	259,244		1,102,530	6,670	
1985	220,980	-14.8%	1,250,980	7,425	11.3%
1986	200,980	-9.1%	1,335,640	7,760	4.5%
1987	178,020	-11.4%	1,384,690	8,100	4.4%
1988	185,740	4.3%	1,459,710	8,300	2.5%
1989	131,520	-29.2%	1,457,490	8400	1.2%
1990	145,000	10.2%	1,425,000	8,500	1.2%
1991	160,000	10.3%	1,391,000	8,900	4.7%
1992	150,000	-6.3%	1,343,000	9,400	5.6%
1993	180,000	20.0%	1,328,000	10,000	6.4%
1994	190,000	5.6%	1,332,000	10,600	6.0%
			International		
1984	270,060		1,209,970	8,480	
1985	302,320	11.9%	1,425,120	9,830	15.9%
1986	339,020	12.1%	1,656,760	11,140	13.3%
1987	382,980	13.0%	1,891,710	13,500	21.2%
1988	468,860	22.4%	2,206,890	14,450	7.0%
1989	469,480	0.1%	2,482,910	16,500	14.2%
1990	508,000	8.2%	2,757,000	18,010	9.2%
1991	545,000	7.3%	3,033,000	19,850	10.2%
1992	575,000	5.5%	3,300,000	21,500	8.3%
1993	575,000	0.0%	3,527,000	22,950	6.7%
1994	620,000	7.8%	3,758,000	23,980	4.5%
			Worldwide		
1984	529,500		2,312,500	15,150	
1985	523,300	-1.2%	2,676,100	17,255	13.9%
1986	540,000	3.2%	2,992,400	18,900	9.5%
1987	561,000	3.9%	3,276,400	21,600	14.3%
1988	654,600	16.7%	3,666,600	22,750	5.3%
1989	601,000	-8.2%	3,940,400	24,900	9.5%
1990	653,000	8.7%	4,182,000	26,510	6.5%
1991	705,000	8.0%	4,424,000	28,750	8.4%
1992	725,000	2.8%	4,643,000	30,900	7.5%
1993	755,000	4.1%	4,855,000	32,950	6.6%
1994	810,000	7.3%	5,090,000	34,580	4.9%

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Medium-Scale Systems Market, 1984-1994

(Source: International Data Corporation, 1990)

Year	Unit Shipments	CAGR	Installed Base	Shipment Value ($M)	CAGR
			United States		
1984	25,930		109,940	8,550	
1985	25,930	0.0%	128,960	8,970	4.9%
1986	20,110	-22.4%	140,310	8,590	-4.2%
1987	20,770	3.3%	151,260	8,750	1.9%
1988	22,990	10.7%	159,910	8,400	-4.0%
1989	18,990	-17.4%	157,980	8,150	-3.0%
1990	19,000	0.1%	156,000	8,100	-1.6%
1991	20,500	7.9%	155,000	8,300	2.5%
1992	20,500	0.0%	153,000	8,200	-1.2%
1993	20,500	0.0%	151,000	8,100	-1.2%
1994	20,000	-2.4%	150,000	8,050	-0.6%
			International		
1984	26,290		103,900	9,250	
1985	26,260	-0.1%	124,590	10,500	13.5%
1986	25,630	-2.4%	142,910	12,210	16.3%
1987	29,620	15.6%	162,770	14,100	15.5%
1988	34,890	17.8%	182,970	15,950	13.1%
1989	35,610	2.1%	201,240	17,150	7.5%
1990	37,600	5.6%	218,700	17,960	4.7%
1991	38,000	1.1%	232,100	19,320	7.6%
1992	38,000	0.0%	244,200	20,300	5.1%
1993	38,500	1.3%	256,200	20,750	2.2%
1994	39,500	2.6%	264,400	21,100	1.7%
			Worldwide		
1984	52,220		213,840	17,800	
1985	52,190	-0.1%	253,550	19,470	9.4%
1986	45,740	-12.4%	283,220	20,800	6.8%
1987	50,390	10.2%	314,030	22,850	9.9%
1988	57,880	14.9%	342,880	24,350	6.6%
1989	54,600	-5.7%	359,220	25,300	3.9%
1990	56,600	3.7%	374,700	26,060	3.0%
1991	58,500	3.4%	387,100	27,620	6.0%
1992	58,500	0.0%	397,200	28,500	3.2%
1993	59,000	0.9%	407,200	28,850	1.2%
1994	59,500	0.8%	414,400	29,150	1.0%

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XMI-II backplane could deliver as much as 80 VUPs of multistream scalar performance.

Within the next two years, according to IDC's Digital Advisory Service, Digital is likely to complement the VAX 6000 Model 500's CMOS3 CVAX CPU with two follow-on processors. Expected in the next 12 to 18 months is a CMOS4 CVAX processor that could offer from 20 to as many as 25 VUPs of scalar performance. Accordingly, an 8-CPU VAX 6000 Model 600 could theoretically offer more than 150 VUPs of multistream scalar performance.

Shortly thereafter, Digital could unveil a midrange system based on the "EVAX" (Extended VAX) next-generation proprietary processor currently being developed under the aegis of the VMS Advanced Architecture Project.

The EVAX's RISC-like (hence the "RISCy VAX" name tag) architecture would run a reimplemented "EVMS" (Extended VMS) and could provide more than 50 VUPs of scalar performance, extended addressing support and complete compatibility with existing VMS applications.

IBM "4391" Outlook

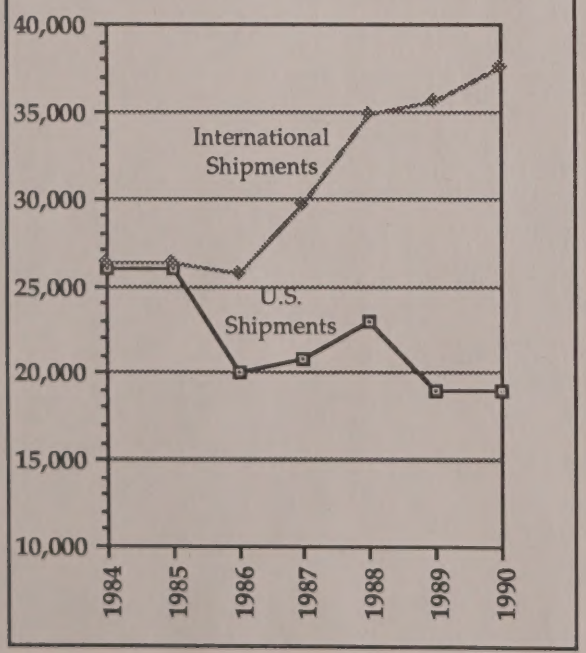
IBM's 4381 add-on, the 4391, is also expected this fall. It will provide $60-70,000/MIPS price/performance based on design enhancements gleaned from the high end. The improvements will likely include "VSE/ESA" — an enhanced operating environment, improved channels (fiber on later models), ESA/370 and SMS-like facilities.

While the 4391 may not aggressively win IBM new customers, it will stem the tide of defections to PCMs and precipitate a new round of midrange upgrades and replacements. The 4391 will require a complete box-swap, though, and the costs of its higher price/performance will be significant.

Users currently operating in a DOS/VSE

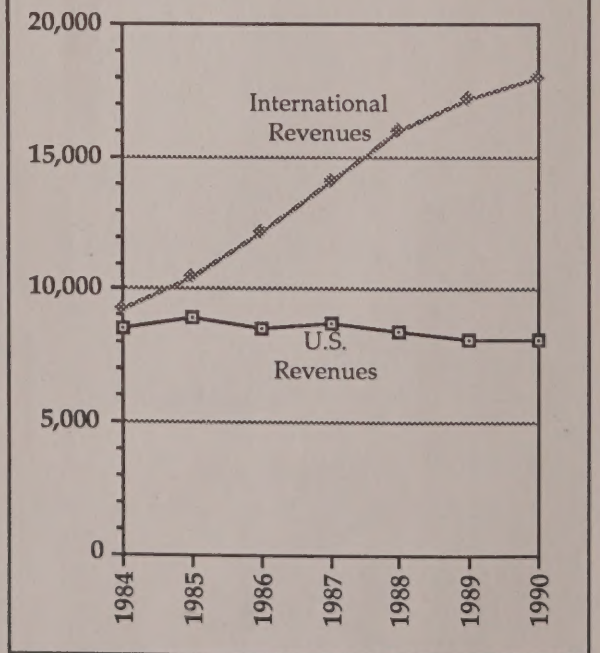
International and U.S. Medium-Scale Systems Shipments, 1984 - 1990(est.)

(Source: International Data Corporation, 1990)



International and U.S. Medium-Scale Revenue, 1984 - 1990(est.)

(Source: International Data Corporation, 1990)



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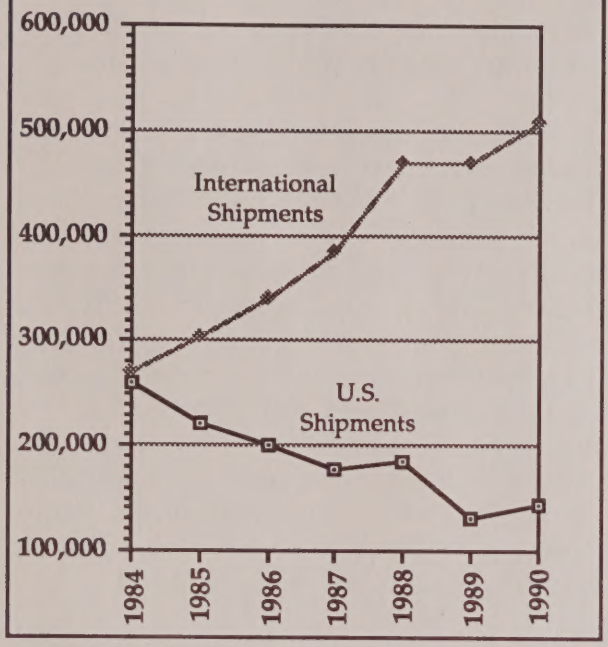
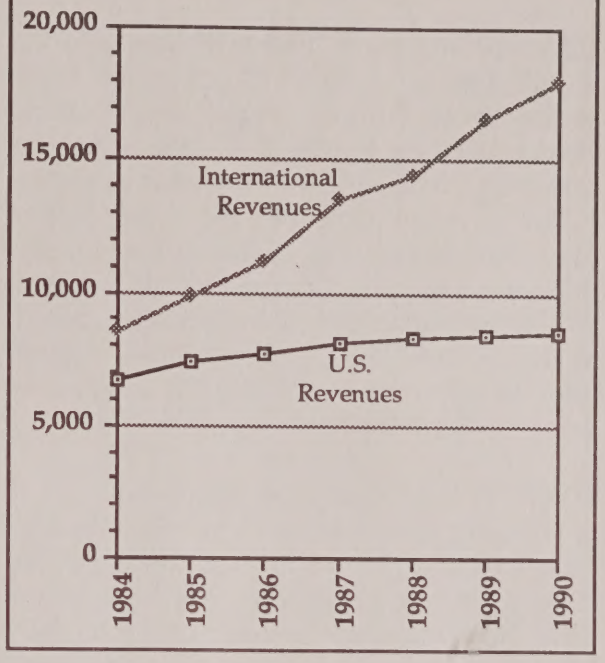
International and U.S. Small-Scale Systems Shipments, 1984 - 1990(est.)
(Source: International Data Corporation, 1990)



International and U.S. Small-Scale Revenue, 1984 - 1990(est.)
(Source: International Data Corporation, 1990)



environment, a considerable 20% of the U.S. installed base of 4381s, may find performance penalties in that mode on the 4391. IBM will probably introduce the VSE/ESA hybrid by early 1991, offering cost-conscious users a smaller transitional step.

As a result, in 1991 the medium-scale segment will, we believe, show the first U.S. growth since 1987. But prevailing conditions will flatten unit and revenue in successive years.

Solutions, Solutions, Solutions

So, what will work in the midrange? Competitive performance is a requirement. But vendors must play within the framework of two generic midrange strategies: value-added proprietary systems or low-cost/high-performance open systems.

Identifying high-margin markets for proprietary systems used to work for DEC, IBM and Tandem. But there's just too much competition these days for cherry-picking.

Success of the price/performance strategy is founded on technological standards. Without them the risks to buyer and seller are enormous. So as Unix International and the Open Software Foundation diverge, the primary means of survival then becomes integration, and the benefits of even the slickest network computing or client/server solutions strategy are neutralized.

The question then becomes: is there money to be made in midrange open systems? Surely the answer is yes. But building product differentiation in the open-systems midrange means vendors must work within a whole new hierarchy while drawing on wholly new skillsets.

The midrange — in its diminished state — is beginning to recrystallize. The effect on strategies is profound. As profound as the challenges of restructuring billion-dollar midrange businesses.

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IBM will introduce "Summit" this fall. But it will just be a 3090 "J" processor logic packaged in Summit frames and covers. Heavy lobbying by the IBM sales force for something with which to compete with the PCMs is responsible for the compromise. The chief benefit for customers is simply the option to invest in a new platform that will be upgradable for 4-5 years as opposed to the end-of-life 3090 platform. "True" Summit systems — 40-50MIPS uniprocessors — will not be ready until late 1991.

HDS's D-Day Machines. Meanwhile, HDS announced attempts to establish a beachhead in the high-end IBM plug-compatible large-scale systems market exactly 46 years after Allied powers landed at Normandy. The first major product announcement since the Hitachi/EDS buy will be positively received by HDS's customers, many of whom have been postponing purchase plans since late '88 to get a better feel for HDS's new composition. The *Gray Sheet* Large-Scale Systems Review and Forecast arrives in August.

AT&T introduced a multiprocessing i486-powered server/mini, although Unix V.4 does not yet support SMP. Until SMP is available in V.4 — Q190 — a single procesor version is available. The new box runs AT&T's version of LAN Manager on top of Unix, as well as Novell's Portable Netware. The multiprocessing technology came from AT&T's work with Pyramid so it's not inconceivable AT&T will eventually put a RISC chip in a similar architecture. Pyramid certainly will.

Oracle announces V6 on AIX. One week after announcing the formation of Oracle USA, a new distribution division aimed at consolidating U.S. sales operations, Oracle has announced availability of Oracle V6 on the entire range of IBM AIX platforms.

U.S. PC vendors are adjusting prices more frequently than in years past. IBM, AST, Hewlett-Packard, Dell and Wang's mail-order subsidiary (WLT Systems) each recently announced price cuts ranging from 5-20%. Dell is particularly subject to price pressure from several sides, increasingly aggressive leading vendors (Compaq, IBM), heavily discounted lower-tier PCs, and mass merchant and mail-order direct channels. While other vendors rely on resellers to respond to market changes, the attractiveness of Dell's price list and advertisements can make or break a sale.

Laptop supercomputers will debut in 2013, according to the Japan Electronic Industry Development Association. The association also predicted that global demand for electronic products would grow about 8.3% anually until 2000, slightly higher in Japan.

One if by land (or was it two?). Dr. Charles H. Bennett, an IBM Yorktown Heights researcher, has developed an encryption device that relies on Heisenberg's Uncertainty Principle to create codes that can't be cracked. The principle states that photons cannot be measured without disturbing their physical properties. Bennett's device allows senders and receivers to generate unique sets of shared random data with complete secrecy, which are then used as a "key" to encrypt future data. The system generates the secure keys even under scrutiny of eavesdroppers who necessarily corrupt the "key" data when they measure it. While the current version of the device only operates over a desktop, Bennett is developing a system that will be extended over several hundred yards.

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REPORT

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IBM's Strengths, Weaknesses, Threats and Opportunities

For IBM, the 1980s were a roller coaster of caution, promise, disappointment, and renewal. The early '80s were dominated by the U.S. Department of Justice's aborted antitrust suit. IBM conspicuously avoided action that might have been construed as illegally exploiting its market power.

The ensuing period was filled with promise. Freed from the shackles of antitrust, IBM built an infrastructure capable of supporting a predicted $100 billion in revenues by 1990. Between 1980 and 1985, IBM's U.S. employment swelled 26%, from 190,000 to 239,000.

The "Great Softness," however, dashed hopes of attaining such lofty revenue goals in such a short time, and forced IBM to reevaluate its expansion strategies. By the beginning of this year, IBM's employment in the U.S. had dropped to 216,000, through attrition and creative use of "early-retirement."

The period of renewal began when John Akers named 1987 the "Year of the Customer." The goal was to transform IBM from a technology company to a solutions company, targeting combinations of hardware, software, and services to well-defined industry segments.

Today, IBM is looking better than it has in some time, although it is not without major challenges. How it faces those challenges is, to a degree, a function of what it learned these past ten years. Five lessons stand out:

- IBM grows as the industry grows. After decades of dictating technology trend IBM has realized that it is too big to exceed industry growth. Whereas its strategies were intended to maximize growth, today IBM spends more time considering what actions it can take to stimulate industry growth, and then capture its "fair share." In this light, the company's recent open systems message seems sincere: if it can induce overall industry growth by subscribing to Unix standards, it might be able to garner a relatively large share of a faster growing market.

- Competition is tough outside and inside. Hundreds of new companies entered the computer industry during the 1980s. Few of them exhibited great appreciation for IBM's oligopolistic leadership. Many set off on previously unknown strategic paths. The result has been clamorous competition. IBM, additionally, faced great internal competition for resources. As the stakes escalated, old ways of conducting business became obsolete, and IBM's ability to coordinate internal resources suffered. The company learned that there may indeed be economies of small and that installed bases can be a double-edged sword.

- IBM needs partners. Although IBM still smacks of "not-invented-here," it learned the value of establishing strategic partnerships. IBM knows it can't satisfy every customer requirement with internal resources, so it has undertaken a massive campaign to identify third-party sources for adding value to IBM offerings.

- Global opportunities require global strategies. In 1989, nearly 59% of IBM's

revenue was derived outside the U.S. While IBM has always been an international competitor, international coordination has, at times, suffered. Multinational customers seek to accrue benefits from volume purchasing, standardized contracts, etc., on a global scale, and not just in local markets. And they want to be able to transfer IBM technologies across borders. IBM is experimenting with new strategies and organizational forms to better present a single, worldwide customer interface, and to better coordinate international marketing efforts.

- Flexibility is an asset. IBM has always regarded its installed bases, technologies, and employees as its primary assets. However, whereas management control of each seemed to be a primary strategic criterion, today flexibility seems to be the attribute maximized. Product life cyles are being managed more flexibly, IBM and external standards are simplifying the introduction of new technologies, and the field is empowered to make decisions closer to the customer. The idea of flexibility should not be confused with organizational slack. IBM is trying to remove slack, improve costs, increase coordination, and enhance strategic flexibility.

Many of IBM's strategic and organizational moves in the past few years reflect these lessons. Moreover, IBM's successes and failures in 1989 reinforce them.

1989: Dashed Expectations

In IBM's 1989 annual report, John Akers wrote: "In a generally difficult year for the computer industry, IBM's performance did not meet our expectations — or yours." Chief among the disappointments was a loss in the United States of $325 million after a large one-time charge on continued paltry growth.

Overall, IBM's U.S. revenue grew 1.7%. International sales fared considerably better, growing 7.6%. Moreover, international sales accounted for nearly 59.0% of worldwide business.

On the product front, IBM's major lines of business achieved mixed success at best. Enterprise Systems, the group responsible for S/370 hardware and peripherals, enjoyed better 3090 results than in years past.

However, 3090 pluses were more than offset by minuses in other S/370 areas. Midrange S/370 — 4381 and ES/9370 — business was lousy in 1989. Quality problems with the high-end 3390 disk device surfaced just before introduction, pushing announcement back about four months and contributing greatly to a -17.5% drop in U.S. peripherals business.

The Application Business Systems Group experienced strong high-end AS/400 growth, solid low-end S/36 sales (now called the AS/Entry line), and continued positive returns with its industry-leading partnering strategy.

Despite the good performance turned in by the larger 9406 AS/400 models, availability continues to disappoint much of the market. Last September's announcement of a new tape drive for these models and supporting release of OS/400 improved the availability picture somewhat, but not enough. Moreover, the AS/400 is not nearly on the same price/performance curve of many of the Unix/RISC machines with which it competes. As Unix/RISC offerings mature, IBM may be hard pressed to maintain the AS/400's value-add advantage in the midrange.

The year-long Compaq/Businessland rift bolstered Personal Systems Business as IBM's U.S. PC revenue grew nearly 6.0%. In-

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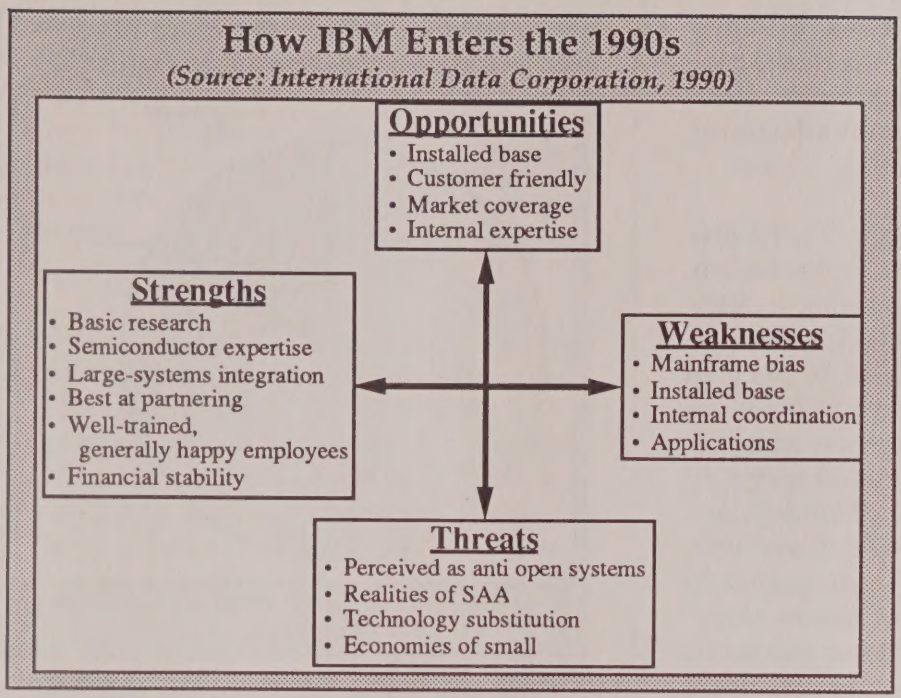

ternationally, the PS/2 line contribution to the top line increased 8%. IBM was also the first vendor to announce a machine based on Intel's powerful i486 microprocessor.

Personal Systems, however, was not able to shake its OS/2 doldrums. The market is ready to reject any strategy requiring numerous migrations, and 16-bit OS/2 cannot be regarded as the platform for the 1990s. The joint announcement between IBM and Microsoft last November to expedite the delivery of 32-bit OS/2 seems targeted to overcome user migration concerns. If OS/2 fails, much of the SAA superstructure is left on shaky footings.

Software announcements dominated IBM's introduction activity last year, and software partnerships offered the best example yet of IBM's new attitudes towards working with strategic partners.

The firm rolled out its first two SAA application suites, OfficeVision and CIMAdvantage. A third software announcement, AD/Cycle — the repository-based collection of tools meant to facilitate SAA application development — might have been the biggest IBM software announcement since OS/360 was introduced in 1964. Building complex SAA applications will require integrated tools and methodologies. AD/Cycle is the first step towards providing a framework for managing SAA development processes.

Still, questions remain about IBM's software delivery schedules. Major components of AD/Cycle, initially promised to ship this past January, are still vaporware. IBM has slipped the dates of large OfficeVision modules twice. Users seem not too perturbed by the problems. They face their own challenges of integrating such massive additions into their code base.

But perhaps the biggest software-related difficulty IBM faced in 1989, and continues to face, is combining the old with the new. In other words, the major engineering challenge facing IBM's SAA developers is how to fuse the company's installed base of software with new software technologies like client/server remote procedure calls. Indeed, now that AD/Cycle demarcates IBM's SAA CASE strategy, the number one SAA priority has to be distributed computing.

Realities of 1990

Of course, IBM faces a number of major challenges in addition to providing additional support for distributed computing in SAA:

- Overcapacity. Modernization of manufacturing capacity, begun in the early 1980s and financed by converting main-

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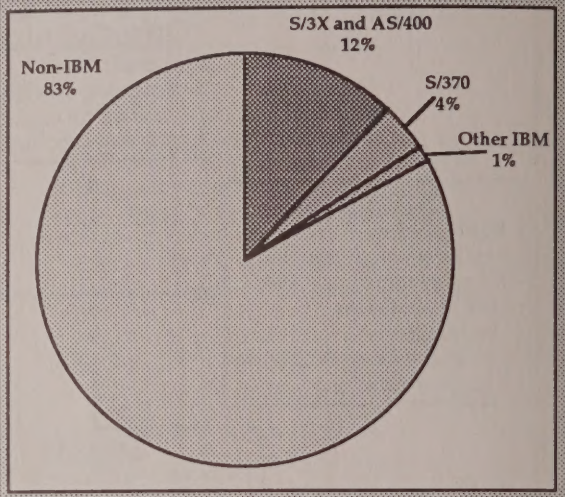
frame rental business to sales, is largely complete. But IBM built a manufacturing infrastructure meant to churn out $100 billion of machines a year. Manufacturing consolidation is required.

- Painful swing to standards. From three standpoints — competition, coordination, and costs — the industry swing to standards is particularly trying for IBM, although it seems determined to keep in step. The standards movement threatens to undermine IBM's long-time proprietary business. The company is trying to juggle a large number of diverse priorities as it labors to enhance SAA, and now the AIX family defintion of programs. In addition, that huge sums of money are required to bring aging software programs forward to compliance creates significant internal tensions as technology groups compete to provide the technological base for the standard.

- Technology- to solutions-provider transition. Although IBM has been talking the solutions sale for some time, the reality is that the transition to becoming primarily a software and services provider is causing major strategic and organizational disruptions. IBM is a beast built over 75 years to market and sell hardware. The company is not taking full advantage of the significant economies of scope inherent to an organization of 360,000+ highly-skilled employees.

- International operations need coordination. IBM takes the "international" part of its name very seriously. Years ago, Tom Watson, Sr., spoke of "world peace through world trade," and he built IBM as one of the first major multinationals. Today, IBM's challenge is to exploit its geographic coverage both by taking full advantage of the strengths of local offices and by better coordinating international sales and marketing efforts.

IBM's Share of the Midrange
(Source:International Data Corporation, 1990)



Total 1989 Worldwide Midrange Market: $45.2 Billion

- The inexorable march of the micro. IBM seems finally resigned to the inevitable: revenue is flowing fastest and most freely to the programmable desktop, mainframe be damned. Instead of rationalizing strategic personal computer and workstation decisions to fit the needs of the company's mainframe business, a new attitude seems to have taken hold. As evidenced by the impressive price/performance of the RS/6000, IBM is more willing than ever to compete on whatever dimensions are dictated by the customer, including price, standards, and downsized solutions.

What follows is a discussion of IBM's major opportunities, threats, stregnths and weaknesses as it enters the 1990s.

Opportunities

- IBM's huge installed base is a continual source of cash which can be used to finance entrances into new markets, modernize production capacity, and perform high fixed-cost basic research critical to long-term technological leadership. IBM's customers provide the company with the most comprehensive source of market

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signals and directions available in the industry. Finally, in time IBM hopes to turn the installed base into a viable source of new technologies. For instance, last October's 3090 J models were introduced with a feature called "hiperbatch," the result of a development partnership between with a large financial institution.

- By deploying its financial, technology, marketing, and support resources in novel ways, IBM has the opportunity to become a leader in delivering "customer-friendly" solutions. If IBM can make buying equipment appreciably easier, it will be in a better position to sell increasingly complex systems and solutions.

- Selling solutions requires attention to detail. From these details, market segments can be isolated and prospects identified. IBM's resources and installed base allow it to do an industry-leading job of market coverage. IBM can integrate internal and external technologies according to its market segmentations into highly customized, and higher-margin, packages.

- IBM's employees are one of the company's best resources. IBM has the opportunity to exploit internal expertise to cover new markets. For instance, in areas like migration, where users have no great need to develop reusable experience, IBM can sell its services — if it can get experts into the field.

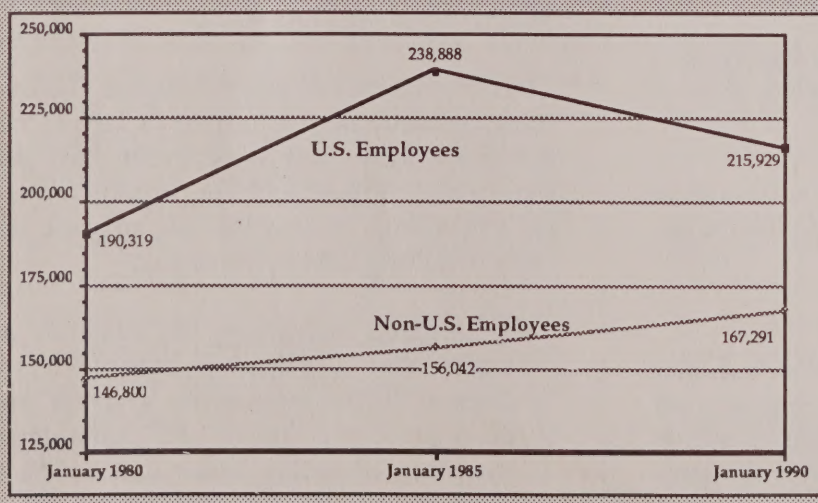
Threats

- Downsizing is real. New technology substitutes to IBM's bread-and-butter machines have arisen, or are on the horizon. IBM must enhance the utility of its larger systems offerings to assure them a long-term place in emerging information processing topologies.

- In the emerging era of open systems, IBM is seen as having the most to lose. It is therefore perceived as anti open systems to the degree that users maintaining an open perspective effectively discount the benefits of IBM's offerings. There is no doubt that the industry's major growth markets are in standards-based domains. For IBM to play in these markets, it must take action to reduce this perception.

- The realities of SAA are that IBM is attempting to drag a whole lot of ancient programs over major political, competitive, and technological hurdles into the 1990s. Moreover, the scope of the project defies comprehension. Coordinating development resources to deliver on SAA is probably IBM's greatest development challenge ever.

IBM Worldwide Employment 1980 - 1990
(Source: IBM, International Data Corporation, 1990)



- IBM is often described as an aircraft carrier attempting to change course amid a flotilla of gunships, none of which has the fire power to sink Big Blue singly, but which, in the aggregate, could inflict serious damage. In fast-moving markets like the

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computer industry, economies of small, which reward strategic nimbleness and creativity, could work against IBM.

Strengths

- IBM is among the leading private sources of basic research in the world. Over the years the company has displayed an impressive knack for converting scientific discovery into commercial product.

- IBM maintains impressive semiconductor expertis, shielding it from the vagaries of upstream politics, and keeping it on top of the microminiaturization trend.

- Many of IBM's development efforts are characterized by great complexity. The company has developed a special organizational talent for managing large-scale projects. The ability to integrate is critical if IBM is to pull off a stunt as difficult as SAA. Moreover, internal integration success could present IBM with an opportunity to be an even bigger commercial systems integrator.

- IBM's partnership network, the broadest in the industry, provides it with an expansive source of hardware, software, service, and support resources. This "value network" allows IBM to offer customers an ever larger portfolio of goods and services without direct investment.

- The company's well-trained, happy, and enormously capable employees lend it great strategic flexibility.

- Finally, IBM's long-term financial stability is another source of strategic flexibility.

Weaknesses

- IBM's perspective on computer industry trends is dominated by a deep-seated mainframe bias. As the computer industry delivers low-cost and powerful microprocessor-based substitutes to mainframes, issues like price/performance, time-to-market, distribution, and open systems will increasingly gain competitive importance. IBM spends too much time rationalizing these issues to fit mainframe marketing requirements.

- IBM's huge installed base can be both a blessing and a curse. As previously mentioned, servicing such a large number of long-standing customers represents a major opportunity for IBM. However, IBM's installed base is not homogeneous. Supporting aging systems and software is a major resource drag on IBM and could potentially hamper the company's efforts to transfer newer, more productive technologies into its customer base.

- IBM is not the most efficient vendor in the computer industry. As a company operating in virtually every corner of the globe and employing more than 350,000 employees, IBM faces a number of burning internal coordination challenges.

- To date, IBM is not a leading software applications provider, despite numerous promises to create an "IBM Way" in the software business. Although the company recognizes software as a major opportunity, IBM remains weak in the applications business.

Watch IBM in Five Areas

Barring a series of mega-mergers, IBM will most certainly be the industry's largest vendor in five years, just as it is today. However, that in and of itself will not provide a metric for evaluating its success. We suggest critically watching IBM in five areas:

- Automated operations. As systems, network, and application complexity increases, IBM's mainframe systems must do a far better job of self management than they do today. Users can not be ex-

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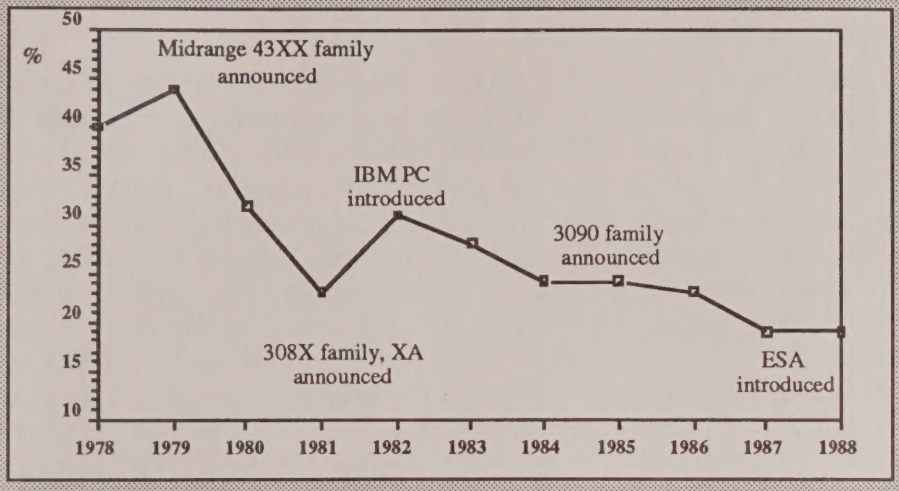
Mainframe Percent of Total U.S. Computer Market
(Source: International Data Corporation, 1990)



pected to hire additional staff every time they expand processing capacity. There just aren't enough skilled people around. If IBM can't deliver tools to enhance operations productivity, staffing requirements will limit high-end purchasing.

- Open systems. The recent RS/6000-AIX introductions are impressive (the *Gray Sheet*, 25-13/14, March 1, 1990), but only a start. The open systems market is the first computer industry growth market of the 1990s. Success requires totally different types of behavior. IBM must build upon the RS/6000 in ways consistent with the trend towards open systems.

- Software and services provider. Selling solutions requires strategies and tactics based on customer requirements, not IBM's portfolio of solutions. IBM may tend to sell "solutions" as it has always sold "technologies": by dictating offerings to customers. For its value-added solutions strategy to be a success, the company must consistently display the capability to rapidly turn customer objectives into integrated sets of hardware, software, and services from both IBM and partner sources.

- Quality. Last year was a lousy year for quality at IBM. The 3090 S models were plagued by serious reliability questions. The 3390 DASD subsystem had to be delayed just prior to announcement because it was not meeting quality expectations. Quality can not become a negative issue for IBM if it expects customers to use IBM equipment to build increasingly complex application topologies.

- Time-to-market. The new competitive environment places a premium on time. Products — both high- and low-end — that slip may be obsolete on announcement day. If IBM consistently misses delivery dates, competitors will step in to provide relief to waiting customers.

Conclusion

IBM enters the 1990s in good strategic position. It has at its disposal a huge portfolio of assets that could continuously provide significant advantages for Big Blue.

However, how the company deploys those resources is a function of its perspectives on change in the industry. If IBM attempts to dictate the pace and scope of change, as it has done in the past, it will encounter competitors and customers unwilling to listen.

There is little doubt that IBM will be the biggest throughout the decade. But to be successful — and to make good on its promise of solving customer problems — the company has to become a much better follower.

With Peter L. Burris, IDC's Director of IBM Research

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Road to Nowhere. The Lotus-Novell merger went bust last week when Novell stockholders demanded greater (equal) representation on the proposed new company's board. Lotus was unwilling to waiver from the original four-from-Cambridge, three-from-Provo arrangement. Vested interest on the Novell side was concerned about potential loss of control to outsiders. What now? Lotus has Sybase and Gupta upon which to base its expansion across platforms. The near-term pressure's on Notes. Novell needs to redouble its efforts to attract ISVs to Netware 386, a task made more difficult by its skittish behavior during the proposed merger.

Windows 3.0 Debut. Feature-rich and finally functional, Windows is (according to Microsoft) poised to bring GUI to the DOS desktop. IBM thinks otherwise, while OS/2 continues to languish. Thanks to the OS/2 opening, Windows 3.0 should meet with success in the next 18-30 months. International Data Corporation's PC Software program anticipates sales increases of at least 75% from last year.

Ricoh Neuro-Circuit. A new large-scale integrated circuit patterned after neural networks and developed by Ricoh can process data without programs. It "learns" by memorizing patterns of numbers, characters, images and sounds. According to Ricoh, the new LSI will have broad applicability and will operate "four or five" times faster than current supercomputers.

Bank by Fax. Sharp and Fuji Bank will introduce a dedicated home banking fax machine for use in Japan, equipped with IC card reader and priced around $350, this summer. They're currently seeking information providers to augment the service.

Portable Update. The laptop PC market continues to attract new products and competitors. However, the market is still a small fraction of the overall PC market, 900,000 units or only 11.6% of the total 7.8 million-unit PC market, according to IDC's PC Hardware program. The laptop market is expected to grow at 26.0% in 1990 to approximately 1.1 million units. While that's a farily impressive rate, an additional 225,000 units is not enough growth to support the number of new vendors. Take Dynabook. Last year, it rolled out a sleek new laptop and landed Computerland as the primary dealer. This year, 70 of 100 staff positions have been cut amid very slow sales. IDC estimates the company shipped a total of 350 units in 1989. Where does that leave the laptop vendors? Compaq, Toshiba, Zenith, Tandy/Grid, and NEC will be the market share leaders. The lower tier is still wide open to a strong notebook offering. The missing ingredient is IBM, which may roll out a notebook before year's end.

Tail (AT&T) Wags Dog (Amdahl). Amdahl and Oracle announced availabiliity of Oracle Financials (Q3'90) and Manufacturing (Q4'90) running on Amdahl's 580, 7300, 5890, 5990 systems, under UTS, an implementation of Unix System V.3.1. AT&T, Amdahl's largest customer, must feel good.

Earrings, Not Data. The search for applications stretches to the frivolous: "accessorizing." Drifting across our desk recently was a press release from Trifari, a Crystal Brands, Inc., unit: "It's fun! It's innovative! It's an ingeniously clever way to learn the art of accessorizing — simply ... easily ... and with computer precision. All with the touch of a button! [...] TUNE-IN will help women feel confident and comfortable in accessorizing with jewelry."

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Will Multimedia Applications Drive Hardware Sales?

What will drive hardware sales in the '90s as desktop publishing did in the '80s? Ask the typical Macintosh user, and chances are you'll get a mish-mash of hypercard, desktop video, and virtual reality premises and promises that build on the nebulous concept of "multimedia."

Multimedia, however, is also attracting the interest of every major system vendor and dozens of independent software vendors (ISVs). Distinguishing between the multimedia hype and hope requires serious scrutiny, and more than a grain of salt.

At the 1939 New York World's Fair, for example, AT&T promoted the picturephone as a communication service of the future. Bell System long-range planners assumed video-over-the-phone would send hardware sales, then network revenue, and as a result profitability, through the roof. In the subsequent 50 years, however, suffice it to say videophone never took off. Voice, data and still-image (fax) still dominate transmission bandwidth. Video remains primarily a one-way, broadcast medium.

Multimedia is being plugged as the coming of age of computers as communication tools. It is also viewed as just another picturephone — technology 50 years early and nowhere to go.

Today's multimedia is a suite of technologies — audio, graphics, image, and video — integrated into existing data and applications to increase a computer system's information-handling ability. It is currently used for training, video-editing, or for creating snazzy, animated (primarily Macintosh-based) presentations. But extending multimedia over a network is more than an evolutionary change.

Three technologies — escalating workstation and PC horsepower, increasingly efficient compression algorithms, and widening high-speed, long-distance bandwidth — are pushing multimedia off specialized, centralized hardware platforms. The multimedia sirens say it is the application of tomorrow's desktop — software that will drive a generation of hardware sales.

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Hardware vendors' quest for applications to propel sales is hardly new. Neither are interactive video communication services. Many of the factors inhibiting the multimedia-as-killer-application scenario are also those which killed the picturephone over the past 50 years. Gambling on the decreasing cost of the catalysts which might promote multimedia's use as a communication tool is still a risky bet, at best. Consider the following:

Conditions Inhibiting Multimedia

- Multimedia is a set of core technologies, not an application. Counting on multimedia to sell hardware is analogous to counting on LISP to sell AI workstations. What's needed is a set of applications — with narrow target markets — which build upon multimedia's information-manipulation handling skills.

- So-called "killer applications" of the past had immediate, tangible benefits. Word processing cut writing time and errors dramatically. Spreadsheets moved number-crunching out of the glass house. Desktop publishing slashed production costs and time, while ushering in an age of visually-oriented user interfaces. But the cost and time-saving benefits of real-time, interactive video, video messaging, graphics, imaging and animation are not yet documented.

- Beyond training applications, multimedia is largely viewed as an expensive whimsy. Users have far more pressing information technology needs than video messaging, or toying with animated presentations. Those pressing needs have won the finite supply of resources and energies.

- The combination of video annotation of complex groupware-style applications may indeed actually save time and increase organizational throughput. But its use in run-of-the-mill numeric-intensive applications — traditional systems' domain — is completely unknown.

Conditions Promoting Multimedia

- Globalized businesses need instant communication to coordinate planning, manufacturing, and distribution functions. The widespread use of voicemail and electronic mail systems to cross time zones and datelines is an endorsement — in theory — for multimedia's potential to increase worldwide management effectiveness through technology.

- Switched telecommunications services in the U.S. alone were a $69 billion business in 1988. Volume (Measured Transmission Services — MTS) grew at 22% annually between 1984 and 1988. The appetite of U.S. businesses for communication services is voracious.

- Starting off the '90s, switched data services cost the same as switched voice services, and data transmission

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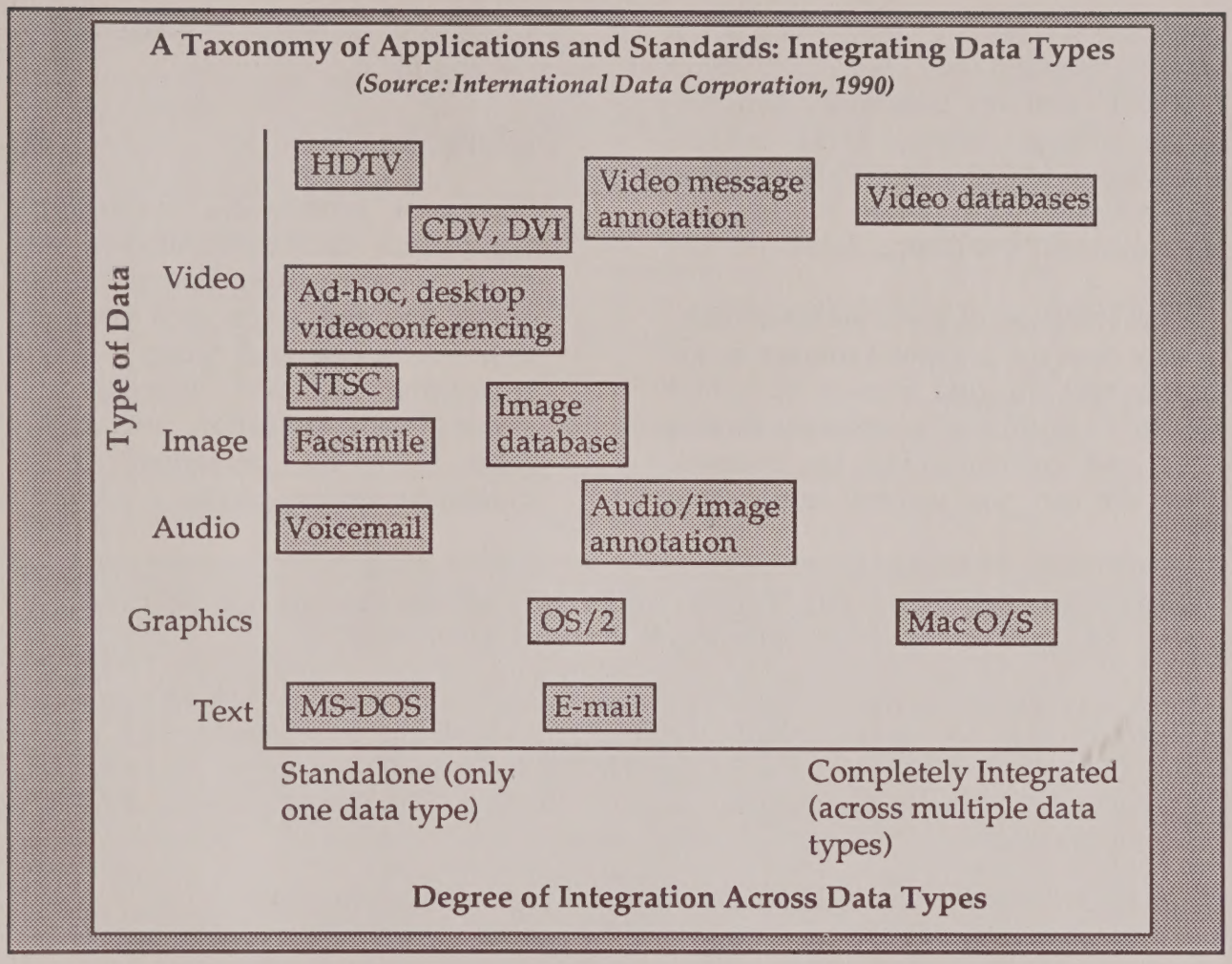

costs continue to decline, thanks to competition. AT&T loses 1% of the long-distance (inter-LATA) market every 90 days, and the lock-step correlation between AT&T's market share and decreasing prices ensure continued data transmission price decline.

•Near-term demand for multimedia training, professional video-editing and presentation-design tools and applications may serve to pull multimedia through the inertia surrounding any new technology.

•The gradual (exceedingly painful?) transition to digital signal-based high-definition television (HDTV) systems creates a window for convergence of television and personal computers.

Multimedia is not, alone, the killer application of the nineties. But future applications of it will be important extensions to current communication products. And specific vertical implementations may provide very real hardware pull.

Meanwhile, the development of multimedia-enabling technology marches on. Videoconferencing and silicon-design firms continue developing compression algorithms that shrink bandwidth re-

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quirements. System and workstation vendors design and construct more powerful desktop processors and displays. Carriers increase integrated services digital network (ISDN) penetration and independent software vendors refine multimedia authoring tools.

But maturation of even the finest technology does not a growth market make. The current frenzied interest in — and hype of — multimedia overstates its sexiness and oversimplifies its potential uses. We can note several multimedia warning signs by which to gauge potential applications:

Multiple Caveats

- Successful multimedia applications will feature integration between data types, not conversion. Converting between text and voice, vice versa, or between image and video siphons computing resources unnecessarily, slowing communication, and duplicates functions performed more quickly by sensory organs.

Multi-Jargon: Demystifying Hypertext, Multimedia and Hypermedia

(Source: International Data Corporation, 1990)

Hyperapplications (or, hyped applications) have been around for a while now. First it was hypertext (Ted Nelson's Project Xanadu, c. 1965), then hypermedia (Bill Atkinson's HyperCard c. 1986) and now multimedia. Only problem is, understanding what they are and why people might get excited about them is rather puzzling. The ***Gray Sheet*** endeavors to straighten things out:

If multimedia involves integrating data types, hypertext and hypermedia involve integrating meaning within data types. Hypertext is "a form of organizing text in computers that permits the linking of any place in text to any other place and the rapid retrieval of information by following trails of the associative links," says Robert E. Horn in his book *Mapping Hypertext)*. Hypermedia extends the dynamic-linking concept to include voice and image records, graphics, and clips of video.

Few will argue the educational potential for hyperapplications. But creating authoring and indexing tools, and then actually applying them, is another story. Indexing and linking the vast reservoir of literature, great works, and scientific and technical journals is a massive job. Hyperindexing future data is a real possibility, but the creation of universal, linked "infobases" to replace the library is still, largely, a pipe dream.

Multimedia is less ambitious (indicating the short-term possibilities of hyperanything are remote at best). It refers to the integration on one desktop of different types of data. Multimedia is the ability to display video windows or run video editing and authoring programs.

The transmission of multimedia information is a step closer to a real application of multimedia technology. Even that, however, is still only a means to an end. Video windows integrated with spreadsheets and images are still just a set of tools in search of a problem. The mediaphone still needs serious focus and development.

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Technical and Adoption Barriers to Multimedia Application Platforms

(Source: International Data Corporation, 1990)

Increasing Bandwidth Requirements

Application Platform	Technological Barriers	Adoption Barriers
Integrated voice, fax & e-mail	Application environments Vertical applications	Traditional (resistance to change, unknown cost/benefit)
Image databases	Authoring tools	Traditional Organizational implications
Desktop video, video messaging, ad-hoc videoconferencing	Compression Bandwidth Storage	Traditional
Video databases, integrated video applications	Compression Bandwidth Storage Authoring tools Indexing tools Lack of vertical applications	Traditional Organizational implications and inertia

- Audio quality will continue to be far more important than video quality for almost every type of general messaging application. Any multimedia application will maximize audio quality.

- Assuming widespread market desire for video and image at the desktop is silly, and expensive.

- A generation of multimedia authoring tools will precede any widespread development of applications by at least two to three years.

- Existing ISVs will not be the primary source for vertical market multimedia applications. User organizations — MIS — will develop individual applications slowly and methodically.

Multimedia will never, in and of itself, provide the simple push and pull hardware vendors might desire. At its best, multimedia is an important platform for

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constructing a new generation of applications. At its worst, it is an egregious example of technological bravado.

Audio, Data, and Image

The first embodiment of a multiple medium communication system — integrated data, voice, and fax — is already here. And it's probably not going to change a heck of a lot over the next couple of years.

Notably less glamorous than the desktop videostations popularized by the business press, platforms like Wang's imaging systems provide integration into an efficient platform. The next step is a fuller integration of audio. The ubiquity of interactive voice response

Pegging Standard Image and Video Compression Technologies

(Source: International Data Corporation, 1990)

Of the data types comprising multimedia, sound and video are the most difficult to manipulate with efficiency. While audio signals are digitally encoded and stored relatively easily, video signals are not. The amount of information in images and video signals (from 2.5Mb to 25.0MB per still video image) necessitates the use of compression algorithms. They reduce transmission bandwidth requirements, as well as storage time and costs, and provide multimedia's version of standards wars.

At least two technologies exist for compressing image signals: Intel's Digital Video Interactive (DVI) and C-Cubed's CL550 Image Compression Processor. The proprietary DVI technology, a brainchild of the Sarnoff Research Center which Intel bought from RCA and GE in 1988, consists of two boards (capture and delivery) and a software toolkit marketed under the ActionMedia label for $7,745. DVI adheres to neither the standards of the Joint Photographic Experts Group (JPEG), nor the Motion Picture Experts Group (MPEG), two CCITT-offshoots and standards-making bodies, but has become the de facto standard for video on a PC. IBM, for example, has endorsed the concept of DVI chips (in every PS/2, or RS/6000, or PC Jr. II?) with a $10 million commitment to DVI technology. Intel claims over 100 ISVs are writing to DVI specifications.

The CL-550 is a scalable chip available in either 10- or 27MHz speed grades. Multiple 550s can compress a variety of video inputs, including the standard U.S. signal, NTSC, or some sort of HDTV. The 550 kit costs $3,000 and includes the first software implementation of the JPEG standards, Compression Workshop. While MPEG standards are still incomplete, C-Cubed expects to deliver full conformance as soon as the standard is released.

Meanwhile, videoconferencers such as PictureTel and VLI have been developing compression technology for years. While those companies do not discuss possible licensing agreements, several barriers would remain to immediate agreements. Most notably, each algorithm has been written in highly proprietary environments, for highly proprietary systems. Transferring the proprietary implementations into either JPEG or MPEG standards would be a huge job.

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(IVR) technology provides testimony of the potential growth of even low-level (as well as bandwidth) multimedia.

Integration between data types is the key to IVR's success. While text-to-voice and voice-to-text conversions are a neat challenge, IVR demonstrates that solving problems is what makes the technology affordable.

Long Road for Video

A second stage of multimedia will include wider bandwidth applications. But even the most rosy projections reduce video to a very narrow — and very long-term — role.

Near-term applications for the long-term video applications of multimedia can be broadly grouped into three categories: process monitoring, training/education, and presentations. But building a powerful killer application from them is still a long way off. Complex monitoring and modelling systems are most interesting, and potentially fruitful.

The Data Suit Set

No discussion of multimedia would be complete without a small mention of the escapism passed off as the ultimate multimedia application. What we're talking about, of course, is the bleak landscape of "virtual reality."

On the surface it sounds like bad drugs: stereoscopic video headgear and skin-tight data suits that respond to every muscle movement. Shared simulations of neon artificial "worlds" where giant blue lobsters snap their virtual claws at projected virtual limbs. What a fright.

"On the surface it sounds like bad drugs: stereoscopic video headgear and skin-tight data suits that respond to every muscle movement. Shared simulations of neon artificial 'worlds' where giant blue lobsters snap their virtual claws at projected virtual limbs. What a fright."

But underneath the delusions are grains of substance. This is, potentially (virtually), the stuff of the brave new computing world. And the applications are impressive, ranging from ad-hoc simulators to training and design.

What's more than a little disturbing, though, is the fantasy which dominates the data suit set's discussion of the virtual vista. Rather than applications and niches, we hear nebulous notions of the ultimate trip. Rather than specific challenges, we hear musings of the psychological damage that might accrue to artificial worlders unwary of the dangers of interfacing in the wrong virtual space.

While the data suit set runs the show, the potential to drop loads of R&D money in the wrong hands is a real threat. Some narrowing of the wide-eyed wondering will, no doubt, hasten the development of virtual applications that might be financially redeeming. Besides saving money from pie-in-the-sky projects, those applications may, some day, provide a palpable push to hardware demand.

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Just Like a Microwave, Eh? Coinciding with the introduction of IBM's new '286 Mod 25 aimed at education markets are unsubstantiated reports that the company is readying another low-end '286 PC for sale through common household appliance dealer channels (i.e., discounters). But no matter how hard it tries, IBM cannot alter the conditions that precipitated the PC Jr. fiasco — channel and product-line conflict, and weak end-user support — all of which still pertain. Structural impediments — not just a questionable product — were equally responsible for the Junior catastrophe. No doubt these machines — if the second is ever actually brought to market — are much more powerful than Junior ever was. But, regarding the mysterious home PC, all that means is it probably won't bomb quite as quickly or with such a thud as the Junior.

Esber Ousted. Reflecting the five-year slide from market dominance of its flagship, dBase (from 62% of PC-based DBMS in 1985 to 42% in 1989), Ashton-Tate's board finally took action, accepting president Ed Esber's resignation and replacing him with Bill Lyons, formerly VP of the applications division. But Tate's problems are far from over: red ink and key technical personnel continue to flow from the company. It desperately needs a general manager of the database division. On top of it all, stock is so undervalued shareholders are likely to vigorously reject any takeover or merger attempt.

Promises, promises. The marketing staff at Computer Associates knew they had to say it to keep existing customers happy and to keep finding new customers, but the lack of evidence of technology behind the PR-babble of last week's long-term strategy rollout makes the announcement even more frustrating than IBM's first SAA announcement years ago. CA trumpeted its intentions to provide integrated, cross-platform families of applications and solutions, but gave no details. It promised a host of integrated life cycle products, but provided no timetable. We'll see.

Morris Avoids Hoosegow. Internet worm progenitor Robert Morris Jr. received a three-year probation, 400-hour community work, and $10K slap on the wrist for exposing a dangerous weakness in Unix electronic mail services and violating the Computer Fraud and Abuse Act. While Morris still faces a host of civil suits filed by some of his victims, the ruling hardly sends out the clear warning to would-be hackers and vandals that many had hoped for. Computer criminals will certainly never make the most wanted lists at your local Post Office should such toothless reprobation continue.

Sparc Laptop, '386SX Rollouts. The pace of PC launches is accelerating, with Spring Comdex on the horizon. NCR joined the growing ranks of vendors with 20MHz 80386SX-based PCs with the introduction of ISA and MCA bus systems. Meanwhile Toshiba's rollout of the first Sparc Laptop drew a chorus of derision. The workstation laptop will appeal to but a tiny cult of hard-core workstation users. Bridging the workstation/PC/laptop market may be a little too much, even for the preeminent laptop maker.

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Lotus/Novell: Netwhere? See page 7.

Zooming in on Image: Recreating Document Processing

Vendors pitching imaging systems invariably recite two platitudes: a picture is worth a thousand words, and image is just another data type. But if image is ever to drive hardware sales in significant amounts, vendors must progress beyond fatuous rallying cries and into vertical markets. When implemented successfully, image is a way of life.

Image systems began trickling into offices in the early 1980s, fueled largely by the efforts of systems integrators. They aimed at solving customers' specific problems and were not interested in developing image systems with general market appeal.

As the technology matured and costs declined, Japanese vendors entered the market with what amounted to an electronic filing cabinet (i.e., the ability to scan, index, and display documents in a turnkey system). The systems fell short of expectations because they used proprietary interfaces and did not communicate with existing office equipment like PCs.

Imaging is again gaining attention as an application to drive hardware sales — all of the major systems vendors are currently developing image systems products. But transforming the use of image systems from back-room archiving to front-line money saving is no small leap:

- Image vendors have typically provided systems for record-keeping services, but the cost of scanning and storing "dead" documents is high, and the payoffs are low. Conversely, system-based document management, which automates document-intensive transaction processes, can yield great savings and provide short-term cost justification.

- To get the big payoff, image vendors need more than just hardware and software skills. Implementing an effective imaging solution raises workflow and process questions that cross organizational boundaries and may step on entrenched toes.

- High-value applications vary widely from industry to industry. Vendors need vertical market experience, or must team up with third-party software developers to crack niche opportunities.

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- Systems vendors, feeling greater bottom line pressures due primarily to slowing industry-wide growth rates, are seeking image business more aggressively. As a result, system integrators must refocus their image practices.

More than one major system vendor has tagged image as its data type — and vertical market target — of the future. But saying image is in and overcoming the price tag, definitional, and organizational barriers impeding its widespread adoption — in other words, contemplating image application development, marketing, and distribution — are very different indeed.

If systems vendors are to capitalize on the opportunities image presents — to drive hardware sales — they face two challenges, even after developing hardware and software solutions to address-specific vertical markets.

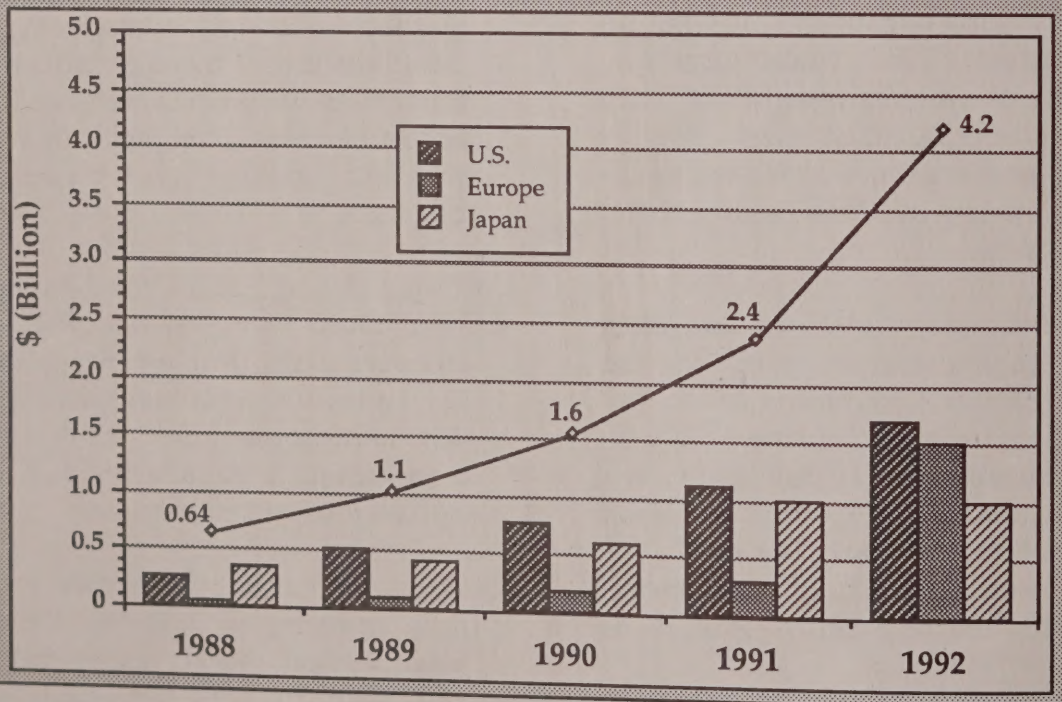
They must be prepared to oversee and engineer radical organizational and procedural changes their customers will undergo as a result of implementing image systems. And they need to be aware of shifting patterns of image system distribution which are changing the face of the business.

Pretty as a Picture

Why image? The benefits fall into two categories. First is detail: image allows operators to recall all kinds of information, not just text, for applications like security screening, engineering docu-

Worldwide Image System Revenue, 1988 to 1992

(Source: International Data Corporation, 1990)



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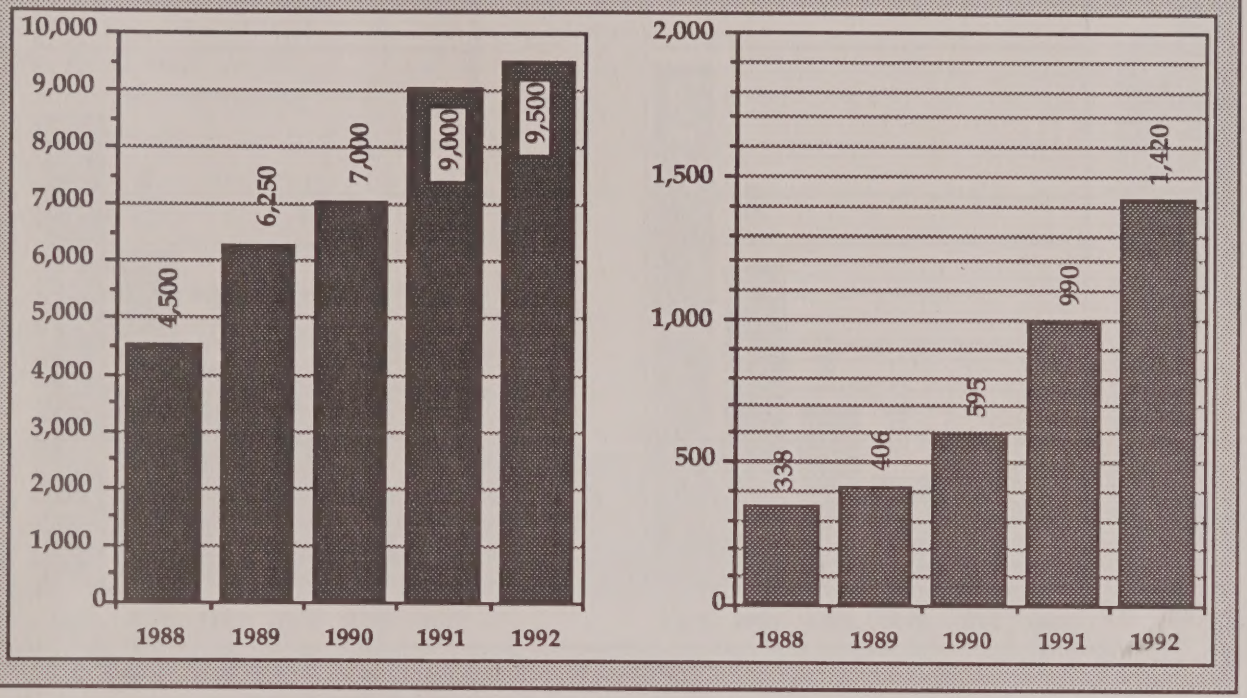
Japan Image System Unit and Revenue Growth, 1988 to 1992

(Source: International Data Corporation, 1990)



ment management, or personnel files complete with fingerprints and pictures.

Image systems provide a more detailed recording of transactions, negotiations or contracts. Rather than just a written description of a property for sale, or the damage sustained in an automobile accident, for example, images can be quickly recalled and displayed.

The second benefit is productivity. Potentially-productive office time is wasted when office workers must track down specific documents stored in dozens, or hundreds, of file cabinets.

Clerical staff and customer service representatives, the imaging theory goes, follow labrynthian paths from file cabinet to file cabinet tracking down, for example, claim forms (insurance), loan applications (financial services), or other information generated outside the organization. Sometime during the meandering, questions divert the wayward clerk who loses track of the original quest and must then rethink the process and begin anew.

Image systems drive personal productivity through the roof, proponents contend, by reducing wasteful search time to the three or four seconds required to display a replica of the original document on a high-resolution screen.

Image as Change Agent

However, like other ground-breaking applications such as spreadsheets or word processing, effective installation of an imaging system requires thorough analysis of an organization's workflow.

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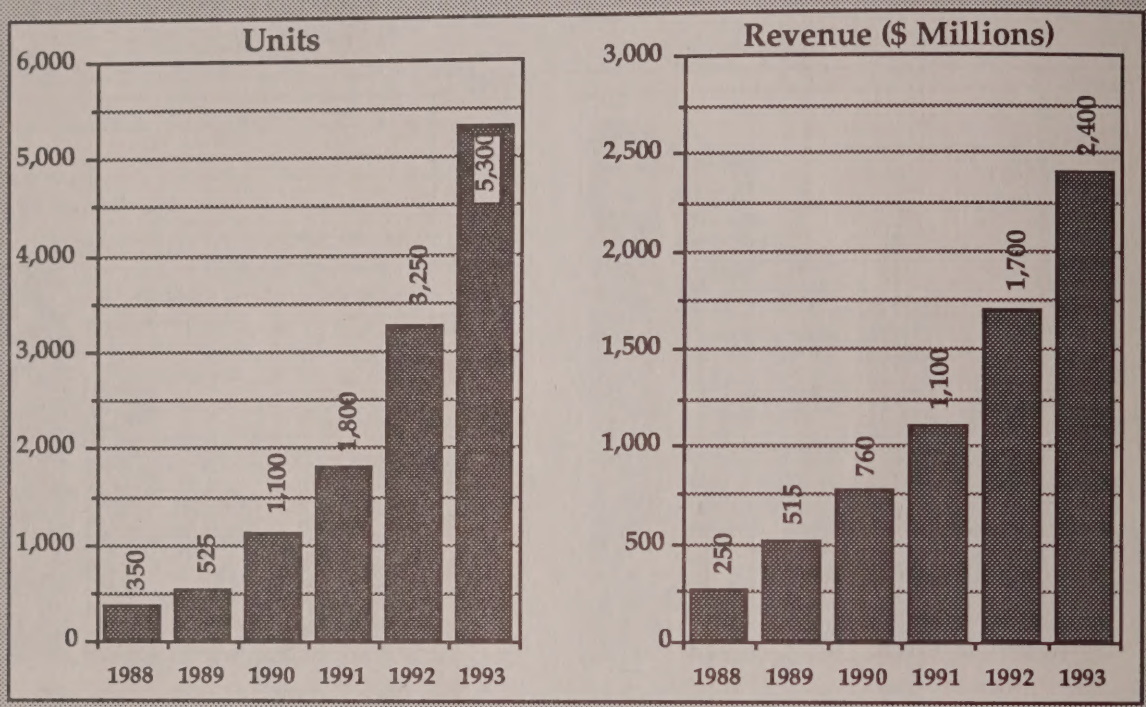
United States Image System Unit and Revenue Growth, 1988 to 1992

(Source: International Data Corporation, 1990)



That systems-based information paths provide faster response times and streamlined information searching than paper-based systems is intuitive. But the real benefits of image systems are the result of comprehensive workflow analyses.

The process of determining where steps can be eliminated necessitates a thorough top-down and bottom-up analysis of the workgroup and organization. The synergy between application of technology and workflow analysis results in ongoing savings.

The process, however, is likely to recommend organizational changes or improvements that test the elasticity of the organization. Whole steps in the work flow may be eliminated, and departments or groups may see their organizational stature relegated to decreased importance.

In successful image installations, status quo is the enemy. Imaging technology rearranges the organization and its formerly static processes and procedures into an efficient new morphology that, thanks to the image systems, provides faster turnarounds time and more complete and accurate information.

A Hefty Price

But the benefits are not without cost. In the first case, scanning, digitizing, storing and retrieving documents are a costly-enough process to prohibit its use for casual record-keeping. Archiving dead or read-only documents in an image system is prohibitively expensive.

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However, installing a document processing system and implementing appropriate workflow modifications have been exceptionally cost effective. Labor savings of up to 30% are not uncommon where image technology is applied to ease formerly paper-based workflow processes.

New Skillsets

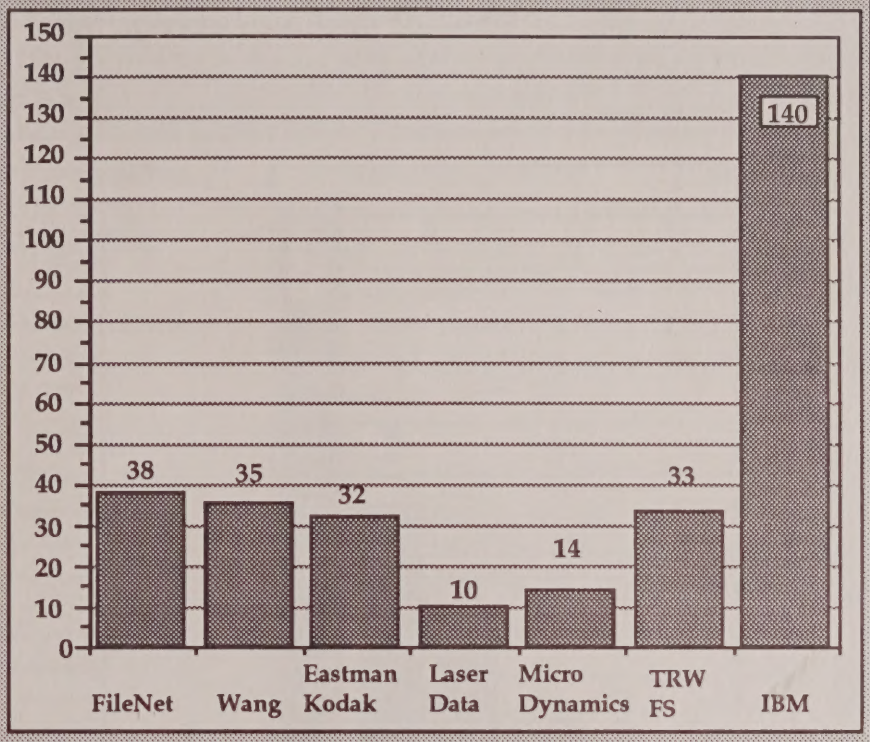
All of which require that image vendors spend as much time implementing and installing their systems as they spent creating them.

Whereas vendors formerly expended resources solving technology problems (primarily storage and bandwidth) that demanded technical skills, they're finding they must now focus on organizational and workflow problems.

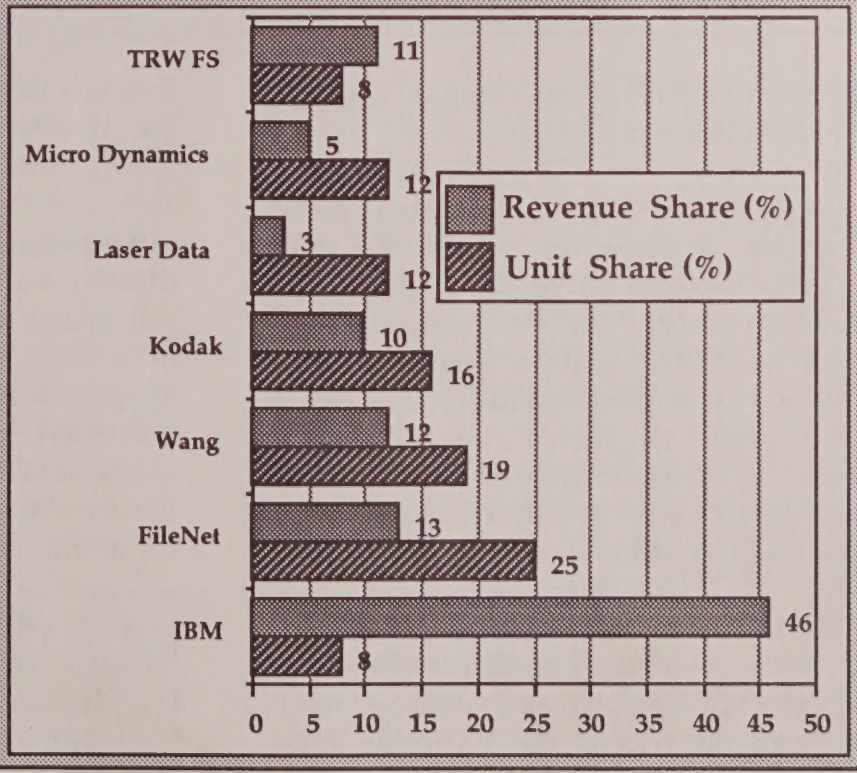
Integrating It All

As a result, organizational management, process and efficiency engineering skills are becoming critical to the success of their im-

U.S. Image System Revenue, 1988 ($ Miillions)
(Source: International Data Corporation, 1990)



U.S. Market Share, Unit and Revenue, 1988
(Source: International Data Corporation, 1990)



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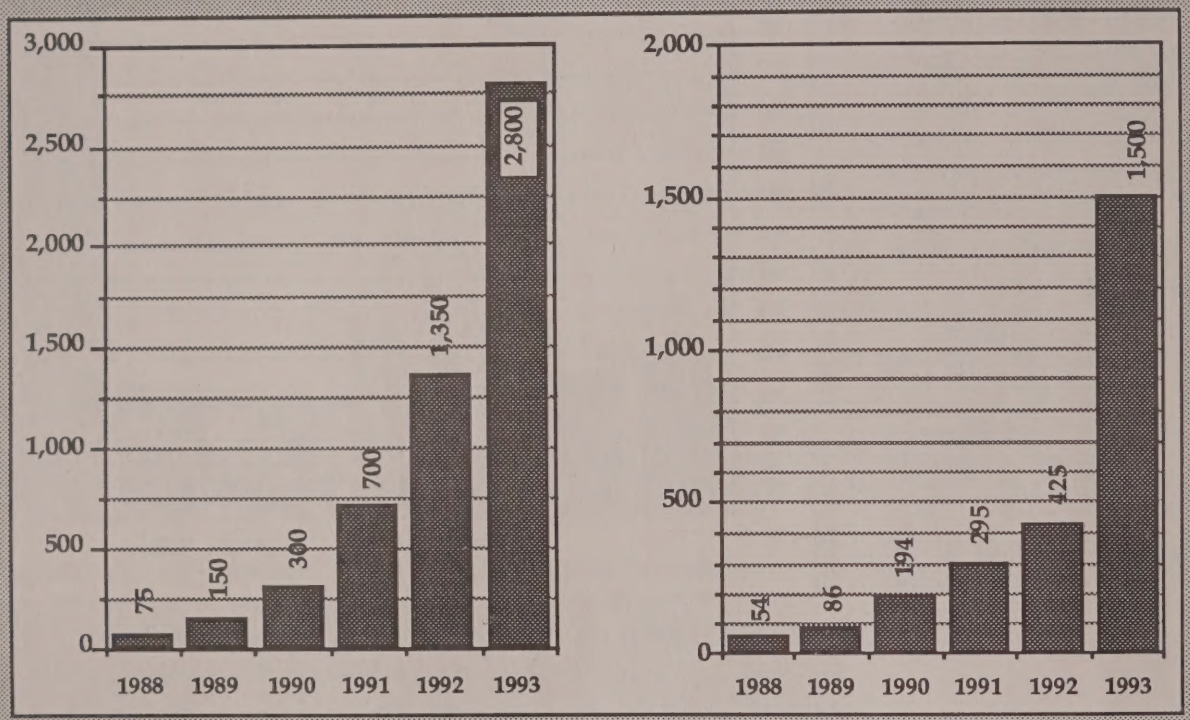
Western Europe Image System Unit and Revenue Growth, 1988 to 1992

(Source: International Data Corporation, 1990



age efforts. And it has changed the role of systems integrators.

For systems integrators, image is nothing new. In the early to mid '80s, integrators literally drove the market, installing more than forty large image systems. With the technology still relatively young, their primary challenges were technical (they were frequently called upon to design and build custom interface boards and device-level drivers) and educational.

However, with custom-built image markets dissolving into distinct bands of vertical applications, and turnkey image systems the way of the '92 to '93 timeframe, integrators will no longer have the luxury of cherry-picking just the most profitable installations.

Increasingly, they will be competing directly with system vendors that also sell image, and sell it aggressively (witness IBM's recent $70 million EPA win). System vendors and integrators alike will need to focus on vertical applications, and broadening their strategic partnerships to meet the needs of vertical market niches.

With Scott McCready, Director of IDC's Image Management Technology Service, and Founder of Avante Technology, Inc.

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Lotus Looking for Enterprisewide 1-2-3 Glue, but Netware Is Nowhere to be Building Cross-Platform, Critical Systems

Lotus's profoundly strategic decision to acquire Novell may be a little long on strategy and short on practical benefits.

Lotus is counting on Netware to hold 1-2-3 together over networks and systems so developers will rely on the familiar 1-2-3 user interface to write enterprisewide applications. Then, with spreadsheets, word processors, databases and a host of other nifty applications sharing the 1-2-3 interface, Lotus will provide a seamless, one-stop software mall for both end users and big-time MIS software developers.

But Netware provides nowhere near the integrity and security of big league operating systems (MVS, VSE, VMS, and to an extent Unix, for example), and the proposed merger simply solidifies the control of those organizations, systems, and users mired in the MS-DOS world, and MS-DOS connectivity, into the hands of one organization. Consider the following:

- Netware RPCs provide shallow rollback and recovery mechanisms, leaving the lion's share of data integrity to the applications it supports. However, in a networked multivendor world — the only one we've got — responsibility for security and integrity shouldn't be left to chance.

- Efforts at developing portable Netware notwithstanding, Netware remains proprietary. Any modernization, increased reliability, and innovation will come from a small team of programmers huddled in a small lab in the desert (even if it is to be moved, apparently, to the West Coast).

Two significantly different views of the merger result. At first, Lotus/Novell continues blithely along, selling millions of dollars worth of 1-2-3 and Netware and making scads of cash.

Synergies between direct sales of Lotus's groupware products, like Notes, and indirect efforts of Novell's high-end VARs will yield significant, positive results for both product groups.

But sometime down the road, Lotus/Novell needs to make big decisions. When it comes time for Lotus to put products where its marketing mouth says they should be, it needs to prime Novell's R&D pump to spit out a solidified, transaction-oriented Netware. And that, witness the difficulties the OSF is experiencing, is no small feat.

While the ultimate success of the merger will be measured by the proficiency with which these improvements are made, it looks good enough in the short term to forestall any misgivings, and reap general praise. But should the glue prove unreinforceable, it may be a different story.

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Dhrystones All Wet. Or so we assumed after Digital's "Workstation Performance Summary" published last July warned against using Dhrystone results to compare system performance. That's because the DECstation 3100 at its announcement came out on top of all other benchmarks, but didn't fare so well on the Dhrystones. Now we're not so sure — Dhrystone results were splashed throughout the DECstation 5000 rollout with the 5000 on top, and nary a disclaimer. Even though by other measures — as well as the dhrystones in question — the new DECstations stack up well in the price/performance race, the fickle use of benchmarking speaks to the perfidy of DEC's marketeers. The moral of the story: your mileage may vary, and it probably will.

AST's Gamble. AST Research, trying to pull a Compaq to NEC's IBM, may be biting off more than it can chew by entering the Japanese PC market with a dual-compatible 386SX PC, running AT-class DOS, and NEC 98XX Japanese-only applications. The system is mismatched to the Japanese market where only 4.5% of PCs installed are AT-compatible. Even if it solves channels question and succeeds in securing a Japanese partner to distribute the system, AST must build demand for the cross- functionality. While AST is no stranger to international expansion with channels in India and the U.S.S.R., creating geographic and vertical markets concurrently is double trouble. If AST really wanted to sell PCs in Japan, it would be well advised to focus, at first anyway, on cloning the 98XX.

Curtains on the OSF? Merger talks between Unix International and the Open Software Foundation were canned last week. Major sponsors' resounding endorsements of OSF/1 — and additional financial support — are sustaining the OSF, despite the fact that IBM, DEC and HP have all recently introduced new versions of their Unix brands. IBM, for example, announced a commitment to OSF/1 for the PS/2 line which sends, no doubt, confusing signals in the wake of the recent AIX on RS/6000 and mainframe platforms. For the OSF to remain viable, it must at the very least convince its sponsors to make the OSF products their mainstream Unix offerings. There's only one company that has ever grown a business out of systems software, and Microsoft had the volumes to do it.

Wishful Thinking. A misreport that Wordperfect, Lotus and Novell would combine customer service groups to provide one-stop technical support got us thinking. Was the staff reporter who misconstrued Novell-CEO Ray Noorda's comments just guilty of overeager reporting? Had he unsuccessfully tried to use Wordperfect and 1-2-3 on Netware recently? Or were the three vendors actually trailblazing a visionary, streamlined, user-friendly customer service and support partnership-of-the-future? Naaaah.

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THE GRAY SHEET
Computer Industry
REPORT

D.B. McLEOD, EDITOR | VOLUME 25, NUMBER 17 | APRIL 6, 1990

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Latin American IT Markets Are Warm and Getting Hot, Hot, Hotter

Picture an underdeveloped, billion-dollar computer systems market with double-digit growth rates set in political and economic systems wracked with instability. Eastern Europe, right? Wrong. Think lambada.

By worldwide standards, Latin American systems markets are growing by leaps and bounds. While Eastern Europe captures media attention, and the Pacific Rim attracts information technology (IT) investments, Latin America is often overlooked as a near-term investment. But Latin markets offer a unique combination of growth and potential:

- Latin American computer systems markets currently represent a paltry 2% of total worldwide markets, but through 1992, unit and revenue shipment growth will average between 20 and 30% annually.

- Western European economies spend approximately 0.5% of gross domestic product (GDP) on IT hardware, Asian/Pacific economies 0.7%. In contrast, Latin American spending on computer systems comprises only 0.2% of GDP.

- Asian/Pacific economies average 1,127 white-collar workers per multi-user system while European economies average 111, and North American economies average 84. Latin American economies average 1,832 white-collar workers per system, with as many as 2,233 per system in Brazil.

The "go global" balyhoo neither begins nor ends at the Brandenburg Gate. A survey of worldwide systems markets shows Latin markets offer growth potential that other regions do not.

Eastern European economies will rouse out of their socialist-inspired stupor very slowly — real IT growth will begin in three years. Western European and North American markets are slowing to single-digit growth. The Pacific Rim is dominated by two very well developed countries, which mask the difficulty of successfully entering a host of undeveloped second-tier markets.

While inflation and political, economic and currency instabilities stand as potential barriers, prescient systems vendors are making poised for growth in Latin America.

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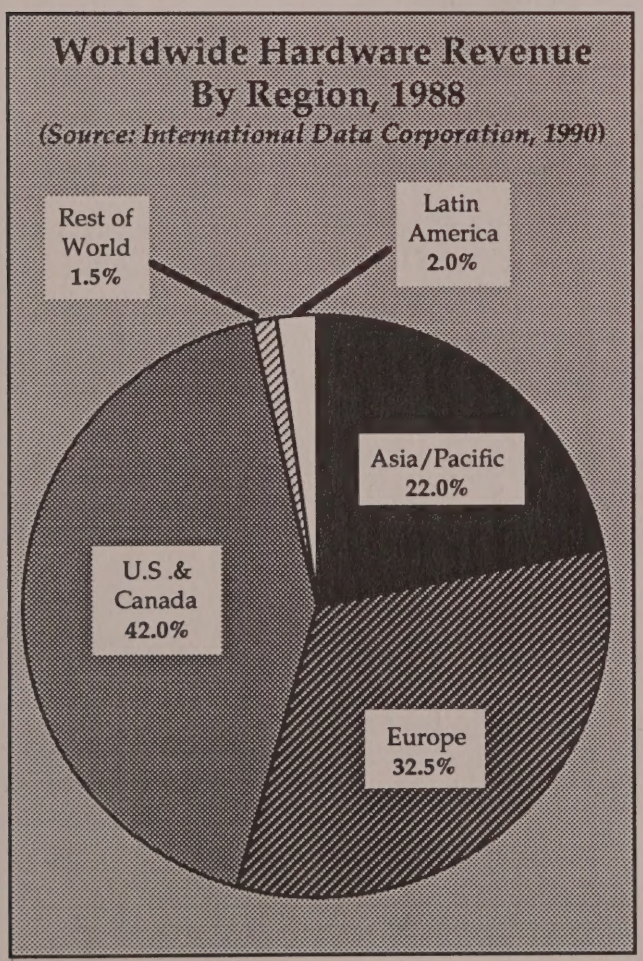
The Two Percent Solution

Toward the end of the 1980s, system vendors began to realize that, while the world is not flat, U.S. multiuser systems markets are.

Latin America's two percent of world hardware markets may make the region seem petite — but only when stacked up against more developed markets.

From another angle, Latin America absorbs more computers per year than the entire "rest of the world" (Mediterranean, East Bloc, Middle East and Africa).



The region's major markets are comparable in size to secondary European and Asian markets, with growth rates that are considerably higher.

However, cracking a new systems market is never easy, particularly when confronted by language, cultural and political barriers. Some of the markets receiving great attention, such as the East Bloc, will offer frustratingly few real returns in the one- to two-year timeframe.

The double-digit — and accelerating — growth rates of some Latin American markets, most notably Mexico and Chile, may be prime targets for system vendors jumping on the globalization bandwagon.

Why Latin America?

Four factors combine to create a rich potential for Latin American systems markets: proximity to the U.S., language consistency (one phrase book works for over 20 countries), growth in the region's rich industrial base, and growing exploitation of sumptuous raw materials resources. Combined with a highly educated workforce, and low IT penetration levels, Latin markets are ripe for growth.

The bustling economic base has already yielded significant computerization in Mexico, Venezuela, Brazil, and Argentina. As a result, an impressive skills base has accrued to user organizations, especially in large systems software development.

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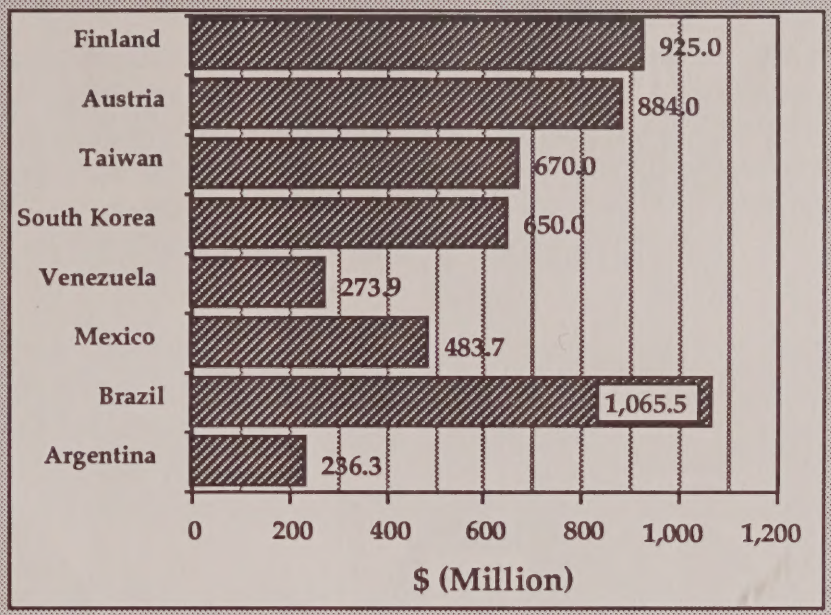
Characteristics specific to individual countryies have created niche opportunities for vendors: production and manufacturing in Mexico, sophisticated large transaction processing systems in Brazil, and a booming PC market in Chile.

Systems vendors (IBM, HP, and Unisys) as well as niche vendors that have made the commitment to understanding the region's unique dynamics, are making healthy profits from their Latin operations.

Hardware Revenue, Latin America and Selected Countries, 1988
(Source: International Data Corporation, 1990)



How Hot is Hot?

These same vendors, who struggled during the late '70s and '80s to scale the region's many entry barriers, are the first to report that the impression of change is becoming reality. Latin American indicators are pointing north.

Unit shipments of PCs are expected to grow an average of 22% a year in the region until 1993, and will be particularly aggressive in markets such as Venezuela where large-scale systems have dominated. Multiuser systems are also expected to grow in the 15% to 18% range, primarily due to replacement of a large number of older systems.

Latin America's creaky communications infrastructures pose significant near-term opportunities if current trends toward privatization continue. Telephone access lines per 100 people average 7.3 for the region, while in the more developed economies this figure ranges from 30 to 47 lines per 100 people.

A well-educated potential user community may also pull systems demand. Fully 27% of those eligible for advanced education are enrolled.

More Crumbling Walls?

Protectionism, debt, political instability and inflation continue to plague Latin systems markets. However, significant improvement has taken place in both small (Central America, Chile) and large (Mexico, Brazil) markets. The four largest markets evolve toward more friendly market conditions at differing rates.

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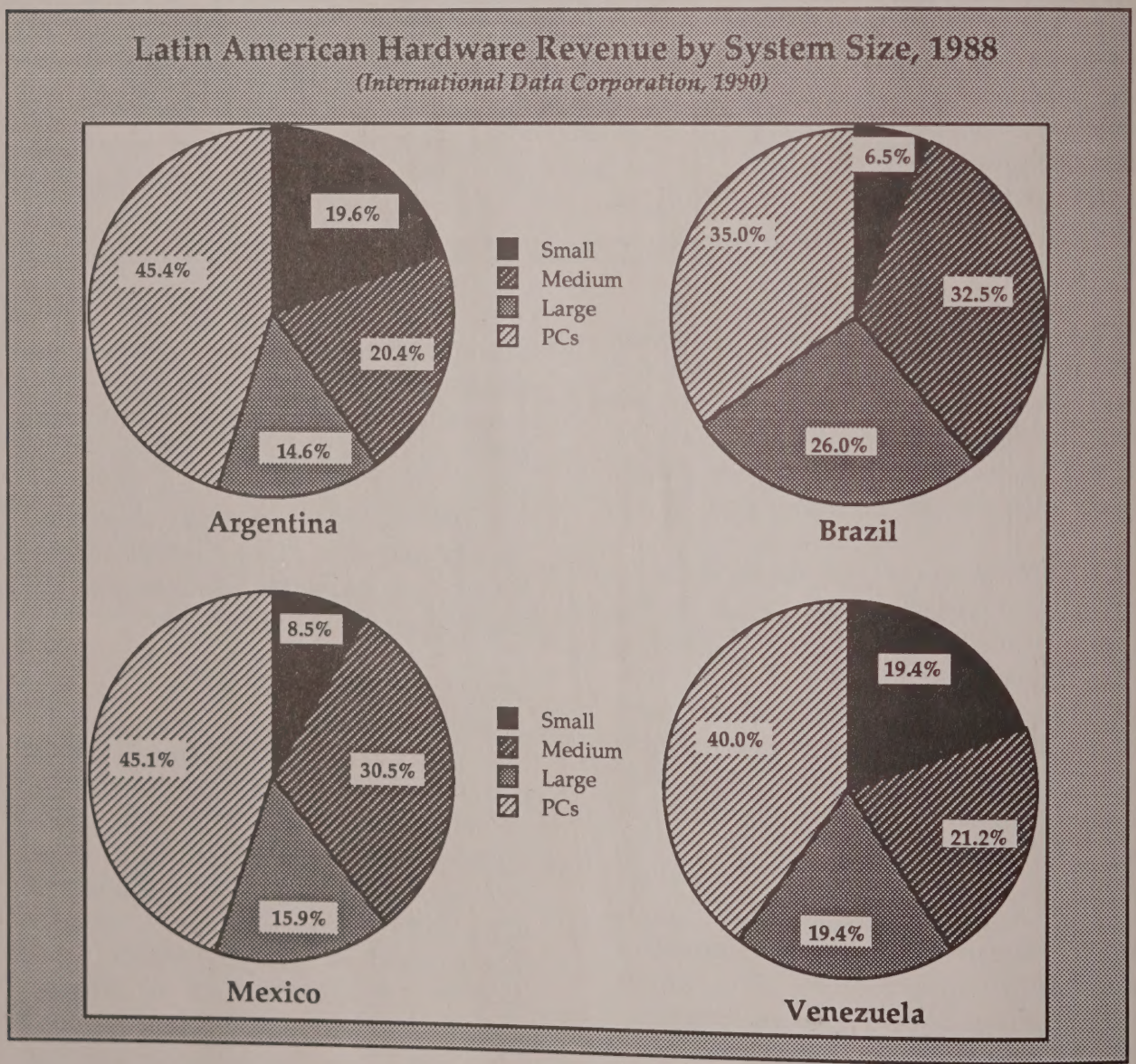
Mexico

Thanks to recent advances on the economic, political and debt front, as well as the gradual opening of its borders to imported computer equipment, the Mexican market is fast becoming brutally competitive. It is the most open of the region's major markets, and, as a result, penetration of size classes has been balanced.

Despite the central role that offshore design plays in Mexico's manufacturing industries, Latin America's first market for technical workstations is quickly growing.

Recent agreements on negotiating a net reduction of Mexico's foreign debt is setting a standard for Venezuela, Brazil and Argentina to follow. President Carlos Salinas de Gortari has implemented domestic programs which have



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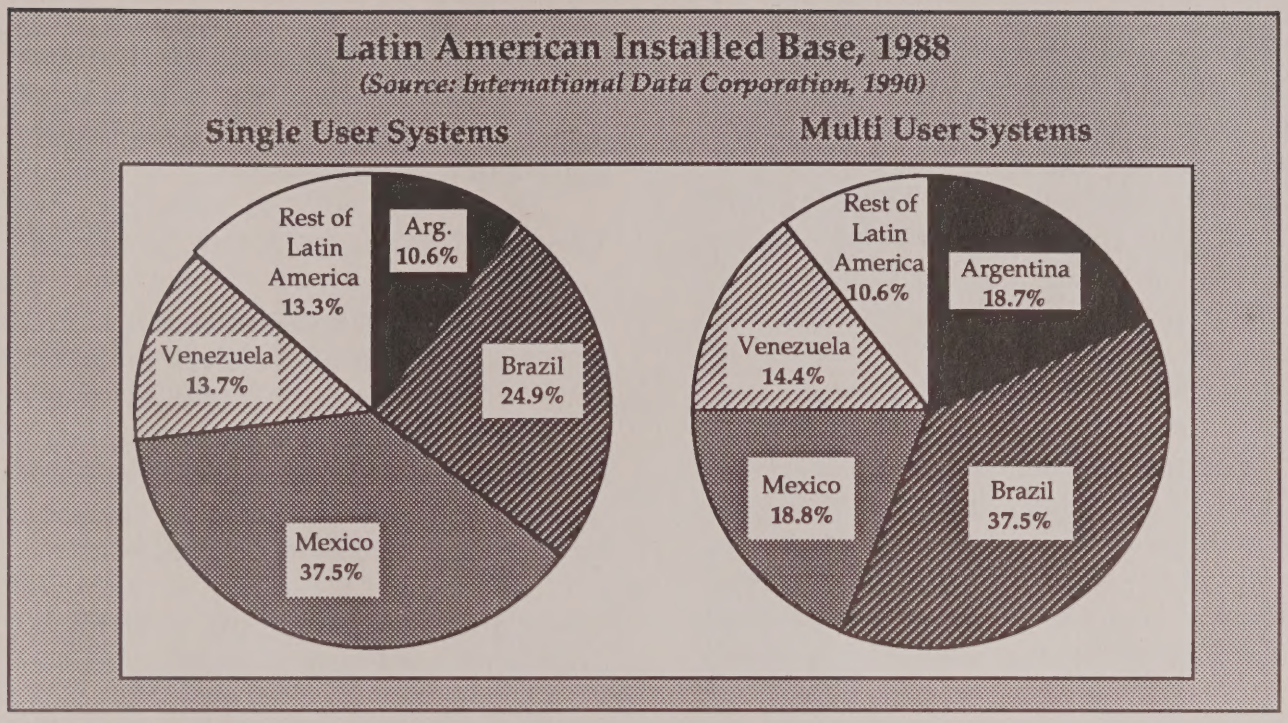

raised his stature, both domestically and internationally, and which are luring back foreign investment.

Brazil

Brazil has a gross domestic product comparable to that of Spain. But the number of multiuser computers installed in Brazil is less than in Spain by a factor of four.

The root cause is Brazil's notorious "informatics policy" which prohibits the importation of all systems except mainframes over the 4381-size class. As a result, only local manufacturers can supply small- and medium-scale systems, and users end up with mixed quality hardware at inflated prices.

It's too early to tell what Brazil's new regime will bring to the informatics debate. President Collor de Mello's "one bullet" to fell inflation has done two things — removed 80% of Brazil's financial liquidity, and shot a few holes in quarterly sales targets.

Politics aside, shortsightedly has never been the way to look at Brazil. Following bad experiences by Olivetti and major Japanese vendors who tried to climb into the market through loopholes in the market reserve, vendors are coming back through the front door. Significant opportunities continue to exist in Brazil — for vendors willing to play by Brazilian rules, as difficult as that may be.

Brazil has long been a captive market for large-scale systems vendors' most expensive products. Ironically, Brazil's runaway inflation swelled bank transaction volumes to such levels that demand for greater and greater processing power increased with each tick on the inflationary scale.

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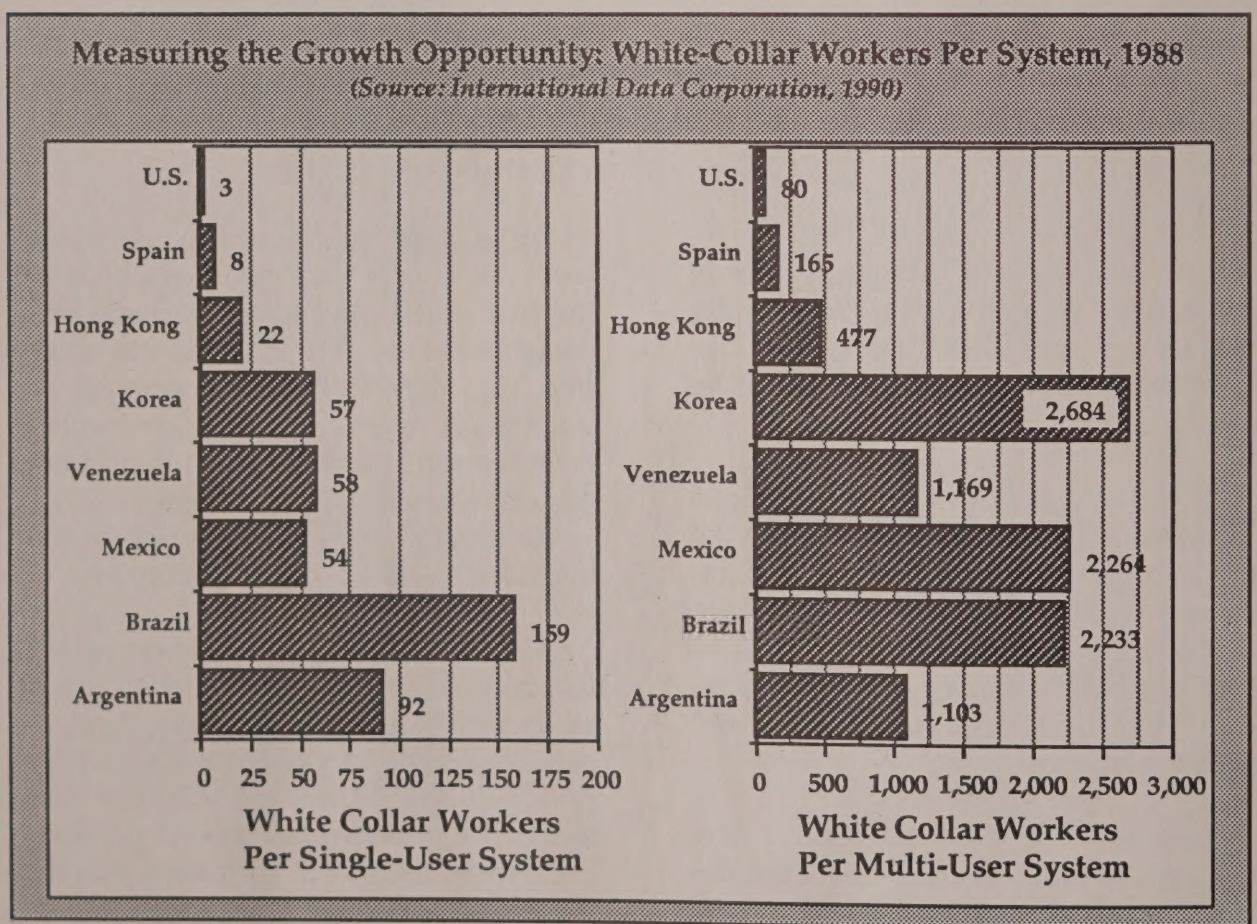
The key indicator that change is creeping into Brazil's rigid reserve system is a recent warming of relations with workstations and high-end PC vendors. The longstanding rivalry between local IT companies and international vendors locked out of the market for most medium-scale, and all small-scale and all PC systems, has, in many cases, turned to cordial invitations for dinner.

Recently, Brazilian IT firms have climbed over each other to negotiate groundbreaking deals with workstation suppliers — a new chapter in the relationship between multinationals and Brazilian producers. Change is coming from the inside out, as users and vendors recognize the difficulty in designing and manufacturing the newest generation of low-end systems.

Venezuela

Venezuela installed the region's first mainframe in the 1960s. Ever since, the country has been dominated by large-scale shops, with oil and mineral firms leading the way. In 1988, major vendors shipped slightly more large systems into Venezuela than into Mexico.

Venezuela made progress in tariff reduction in 1989. The short-term distor-



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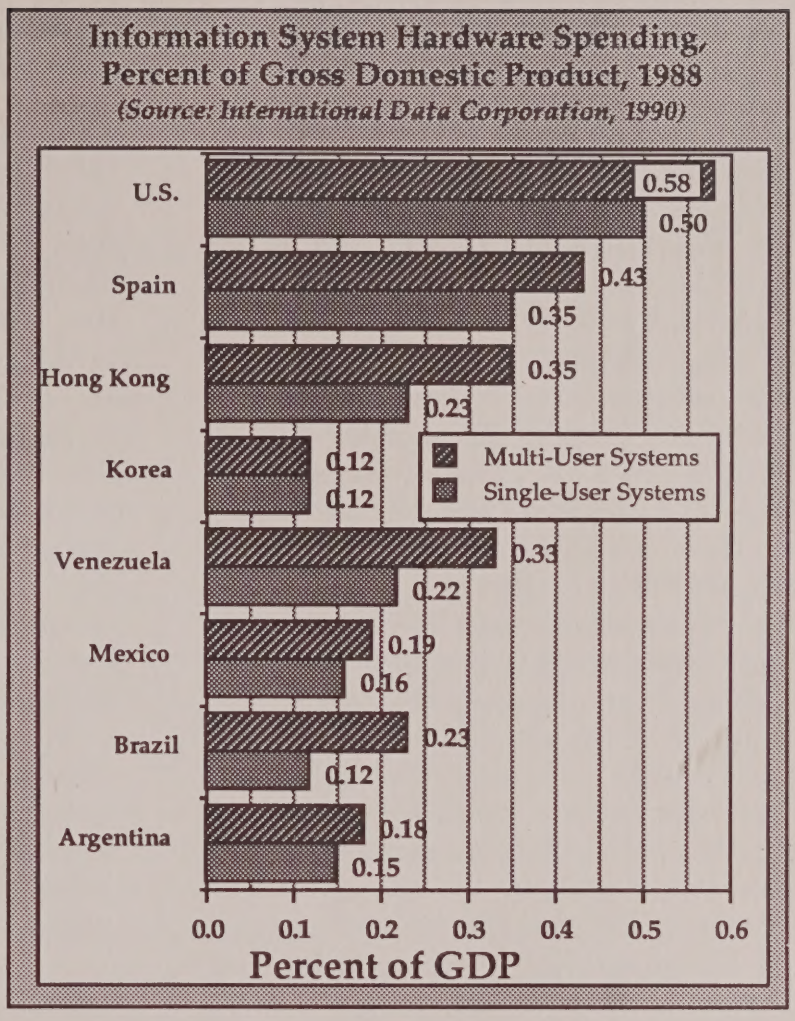
tions created by elimination of preferential dollar exchange rates have largely played out in the market. Software development remains particularly active. Forward-looking developers are taking advantage of relatively low-priced, high-quality labor for regional product development.



Argentina

The number of PCs installed in Argentina is low, particularly compared to Venezuela, a country with about 2 million less white-collar workers. However, in terms of hardware revenue, PCs absorb approximately 45% of Argentinian IT spending.

Argentina has had wide policy swings, from almost no protection of local industries in the 1970's to a policy of very high import tariffs in the 1980's. The tariff for PC's, workstations and related peripherals remains very high (at 80% until October), while larger system tariffs are between 5 and 25%.

Argentina faces the most difficult structural problems in Latin America. Sales of computer equipment slowed drastically in 1989. Over the next five years, however, the market will likely rebound as the current hyperinflation creates even larger needs for tight monetary and transaction management systems.

Small-scale systems have been the bread and butter of Argentina's medium sized companies. These organizations are expected to rebound most quickly in better economic times. If Argentine financial services companies and manufacturers are to compete internationally, tariffs on computer equipment must come down further. It remains to be seen, however, whether the Carlos Menem-led government will be around long enough to bring this about.

By Paul J. Pastrone, Director of IDC's International Research Services Group, (508) 935-4528.

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Minisuper Shakeout. Cray's acquisition of Supertek (announced March 29) and Multiflow's demise (March 28) leave only a handful of supercomputer players, and only Cray and Convex showing healthy bottom lines. The Cray/Supertek deal is a natural considering the compatibility between Supertek's S-1 and the X-MP. But Cray may be reopening Pandora's box. Unless it clarifies how Supertek's Y-MP-compatible minisuper R&D effort and its own low-end development project will coexist, it may again be fighting a two-front war. With times getting tougher in the supercomputer trenches, it's unlikely Cray could justify supporting two R&D efforts concurrently. Multiflow, after six years and $50 million in venture capital, wasn't quite as lucky as Supertek. Negotiations for additional funding from Digital Equipment fell through at the last minute, leaving Multiflow's board with no alternative but to cease business.

OSF Concession. In an attempt to derail AT&T's V.4 momentum, the Open Software Foundation announced very aggressive pricing (volume discounts up to 80%, $65 one-royalty-fits-all) for its unknown and unavailable operating system. The scheme might be attractive to hardware and software start ups, and small ISVs new to the Unix world, and it buys the OSF a little attention, but the OSF's success is a direct function of member vendors' OSF/1 shipments.

Prophet of Gloom. Misbillings in Oracle's accounting system resulted in net income growth of only 1% during the third quarter of FY90, despite record quarterly revenues (up 54% to $236 million). The bad news precipitated a run on Oracle stock, to the tune of single-day, record-setting volume on NASDAQ, and the loss of 30% of the stock's value. What's wrong that Oracle finds it necessary to jam sales through before thay're actually completed? Oracle's always been blasted for being a little too arrogant (with some observers noting that only Wall Street analysts and the *Gray Sheet* editorial staff are moreso), but resorting to book-cooking to hit their lofty growth projections is bad form. With the basic conditions that created the strong database market — and a strong Oracle — still in place (if somewhat softened), rebuilding lost goodwill will test their fundamentally very sound strategy, but not break it.

1-2-3 Dimensions. More multiplatforms from Lotus, this time 3-D graphics on OS/2 and PM. Server and node editions of 1-2-3/G, in addition to a Datalens driver for SQLserver, are expected later this year as Lotus continues to try to sneak into the glass house through millions of PCs running 1-2-3.

A Tribute. How to replace a legend? An Wang's death last week leaves a void that will never be completely filled. The philanthropic Doctor will be remembered as a great technologist, inventor, and, to the chagrin of some Wang stockholders, as a great family man. The *Gray Sheet* mourns, and salutes one of the industry's finest ambassadors.

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Software Platforms: Vying for Control of the Information Grid

Costs and competition are often the foremost forces behind major marketing thrusts. Providers of information technology in the late 1980s have been employing a new concept to offset technical (and marketing) problems causing (and stemming from) skyrocketing software development costs, both internally and among customers, and increased competition in systems markets: the software platform.

The range of options is wide and emanates from a diverse set of proponents. In 1987, XPG, Systems Application Architecture (SAA), and Systems Development Architecture and Support (SDAS) facilities were proposed by, respectively, the X/OPEN consortium, IBM, and Fujitsu. In 1988, Digital outlined Network Application System (NAS) and the Open Software Foundation gave the world OSF/0 (no pun intended, we're sure). In 1989 Computer Associates, representing one large corner of the software industry, outlined Application Construction Environment (ACE), and Hewlett-Packard has more fully developed its New Wave direction. These are just a few of many.

Application portability, particularly for the purposes of scalability, is the benefit most often associated with software platforms. Application performance penalties, the possible result of writing to a generic machine definition (i.e., separating an application from powerful features in hardware), are the most often cited costs. But many other technical and competitive issues are at play. Consider the following:

- Distributed computing, whereby autonomously operating and geographically dispersed computing nodes synchronize processing towards performing virtually unified instances of work, is certainly possible without software platforms, but may be practically and economically infeasible.

- Most software platform models are similar enough that intervendor interoperability should be greatly simplified once the current platform skeletons are given flesh. The result: switching costs should be lowered and deployment flexibility should be increased.

- Rapid advances in microprocessor price/performance will lessen the processing costs of platform overhead, thereby supporting downsizing in standalone environments. However, control and bandwidth costs may generate significant economies in personnel and I/O, thus favoring larger, highly-integrated, centralized systems (e.g., IBM's 3090 mainframes).

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- The platforms themselves will not come cheap. The high fixed costs of software development, risk, and maintenance in the face of ongoing advances in software platform technology will result in lofty price tags for major components.

A major fracas is brewing, fueled by much flash and little fiber. Advocates of the various platforms are anointing themselves as standards setters and bearers while vociferously decrying the relative merits of alternatives. However, like so many petty wars, confusion — and misinformation — are the chief sources of tension.

What Means Thee by Platform?

Evaluating the merits of any particular proposal requires a generic software platform model. In addition, we will bring to light the cooperative and competitive purposes of developing such platforms.

We refer to the proposed collections of software interfaces, protocols, and working rules as "platforms" for the following two reasons:

- These collections, while not being mutually exclusive, are nevertheless in competition with each other for market acceptance; none has received a mandate. Decorum therefore demands that we not refer to IBM's "architecture" as an environment, nor DEC's "environment" as an architecture.
- In truth, the proposed collections are neither architectures nor environments. Each is currently missing critical components and will undergo a great deal of change in the near term; also, none has matured to the extent that it is conditioning the process of application development (i.e., no one currently engaged in application development behaves in accordance with the proposed collections). Both "architecture" and "environment" convey a sense of completeness and stability that is not deserved.

In choosing the term "platform" we simply wish to communicate the following:

Each of the proposed collections attempts to raise the focus of application development to an adjoining level above hardware and operating system dependencies.

Software Platform Characteristics

Software platforms demarcate system functions into discrete and invariantly defined application "services." These services are presented to application developers as a collection of high-level (relative to the machine and operating system) programming interfaces and protocols. Application developers are expected to write to the interfaces rather than to the operating system. Given that the application has been written to the platform's interfaces, the platform provides an integrated set of mutually supportive services available to the application at runtime.

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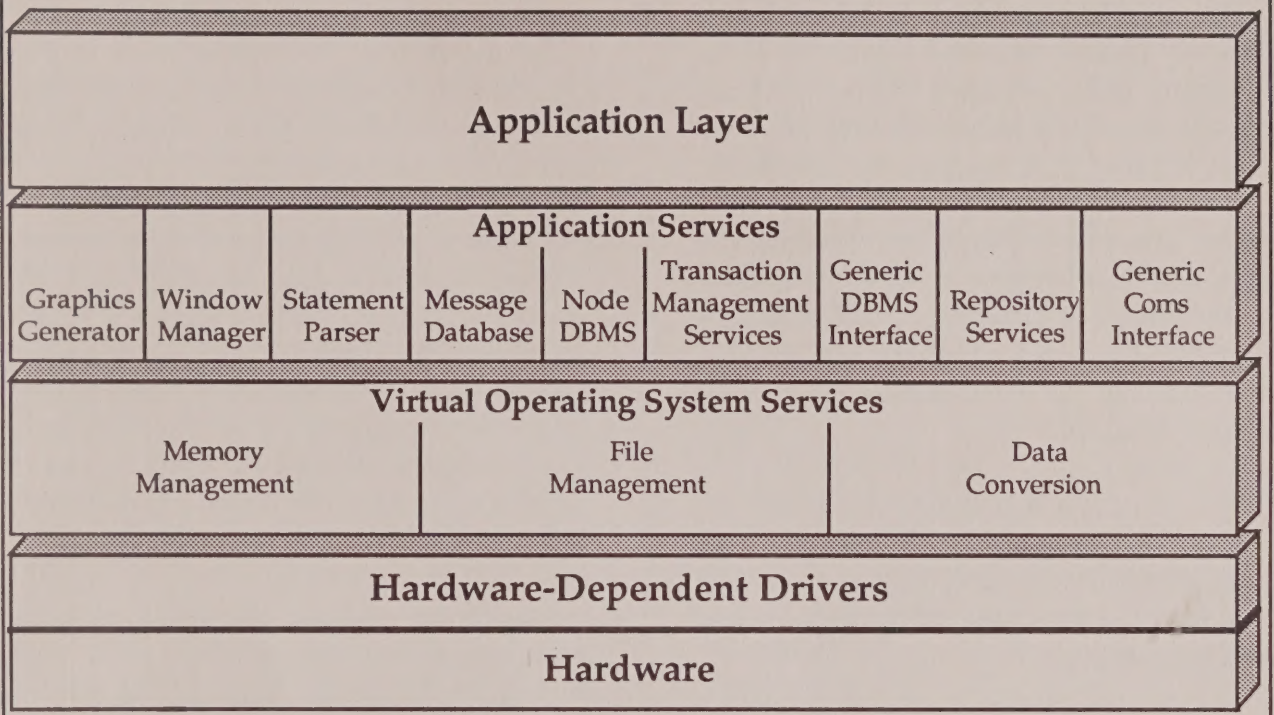
A Generic Software Platform Model

(Source: International Data Corporation, 1990)



The above figure details a general representation of software platforms. Supporting the entire structure is, of course, the system's hardware. The hardware resources are managed by an operating system. Device drivers and other hardware and operating system-specific functions are positioned in the dependent layer. Together, these three layers provide the local foundation upon which rests the cross-system software platform.

The software platform itself is comprised of two layers: the "generic" operating system layer and the product services layer.

The generic operating system layer comprises three major functions: memory management, file management, and data conversion. These three components provide cross system services for, respectively: memory allocation and deallocation irrespective of the host operating system; file input, output, and creation as well as file directory management; and converting data from one format to another, be it an "internal" format conversion (e.g., zoned to packed decimal) or "external" format conversion (e.g., one national standard to another).

For the purposes of our representation, the application services layer is comprised of eight components:

- The graphics generator provides common graphics support for charting and plotting across terminals

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and plotters; associated device drivers are located in the dependent layer.

- The window manager provides common presentation support (i.e., screen and keyboard syntax and semantics); associated device drivers are located in the dependent layer.

- The statement parser establishes the legality of every program or user statement, regardless of national language or other presentation syntax, according to a common language specification.

- The message database provides common message management, such as error notices or specific user prompts, across systems and different national languages.

- The transaction management services component provides common cross-system services for data integrity (interlock resolution, concurrency, security, and rollback and other recovery functions), high-level resource management (cleanup and process optimization), and inter-device input/output control, browsing, spooling, and destination).

- The generic DBMS component provides two closely related services. First, to support the data needs of application processes located at each node, it specifies the minimum requirements and behavior of a local database engine; associated database drivers are located in the dependent layer. Second, it provides an interface for performing database management services at the node, such as changing the underlying data model or tuning the engine.

- The repository services facility provides cross-system services for the definition and management of application and data objects, such as command files, data sets, and system monitoring functions.

- The generic communications interface present a logical image of the hardware-dependent network to an application. This image can be either host-based or distributed, depending on the requirements of the run-time environment; associated device drivers are located in the dependent layer.

Numerous designs of a software platform are, of course, possible, each one, perhaps, reflecting alternative objectives. If "simple" portability is the design goal, then much of the communications complexity associated with distributed processing can be ignored.

The Distributed Form

However, market requirements are, for the most part, demanding that vendors design distributed computing functionality into platforms. All pieces of the model must reflect such design goals, but three in particular are most critical to distributed computing success: the generic communications interface, the generic DBMS engine, and, to a lesser degree, the transaction management services component.

One generic communications interface technology that is receiving a great deal of interest is the client/server model. The advantages of the client/server

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approach to distributed computing are many, but a few stand out, such as evolvability, security, availability, and data and process integrity.

The various design schemes of client/server share a common predicate: to improve performance, increase configuration flexibility, and enhance function, cleave the application. Thus, services on both client and server nodes may replicate the platform, but the functions performed at each might greatly differ. The server may spend more time processing requests to a common database, while client MIPS might be employed to present an intuitive, graphically-based logical view of the processing environment to an end user.

One technology that is emerging as very critical to distributing database services is the two-phase commit. The availability and integrity requirements of database management on a single node are complex enough. Two-phase commit is a strategy to guarantee the same levels of availability and integrity where the physical database includes the additional complexity — and uncertainty — of a network.

Software Platforms and Cooperation

Widespread acceptance of a standard software platform would benefit both users and providers of software alike. Software portability is the most often identified promise of a software platform, but we can identify five other and perhaps greater shared benefits, each pointing to the lofty goal of creating more "natural" — in that they better reflect an organization's work flow — computer-based information systems:

- Software platforms could greatly facilitate the process and management of software development, maintenance, support, and training; software associated productivity would rise.

- As change is the only constant, the integrity of an organization's information system is constantly under attack. Software platforms will heighten an information system's responsiveness to change by making maintenance and retraining an easier and less costly endeavor.

- A software platform would provide a framework for managing the introduction of new technologies into the information processing environment. New types of hardware, perhaps faster and more efficient or cheaper to produce, could be introduced below the platform if the needed device drivers were cost effective to develop and operate. New software technologies, such as synergetic software which makes best use of the unique characteristics of each node in an application system, could be introduced atop the platform.

- A single pervasive standard for the delivery of electricity has resulted in a massive and remarkably flexible North American "power grid." The widespread acceptance of a software platform could empower enterprises to construct a similar "information grid": a ready set of functions into which new applications and new nodes, and thus new users, could be more easily introduced.

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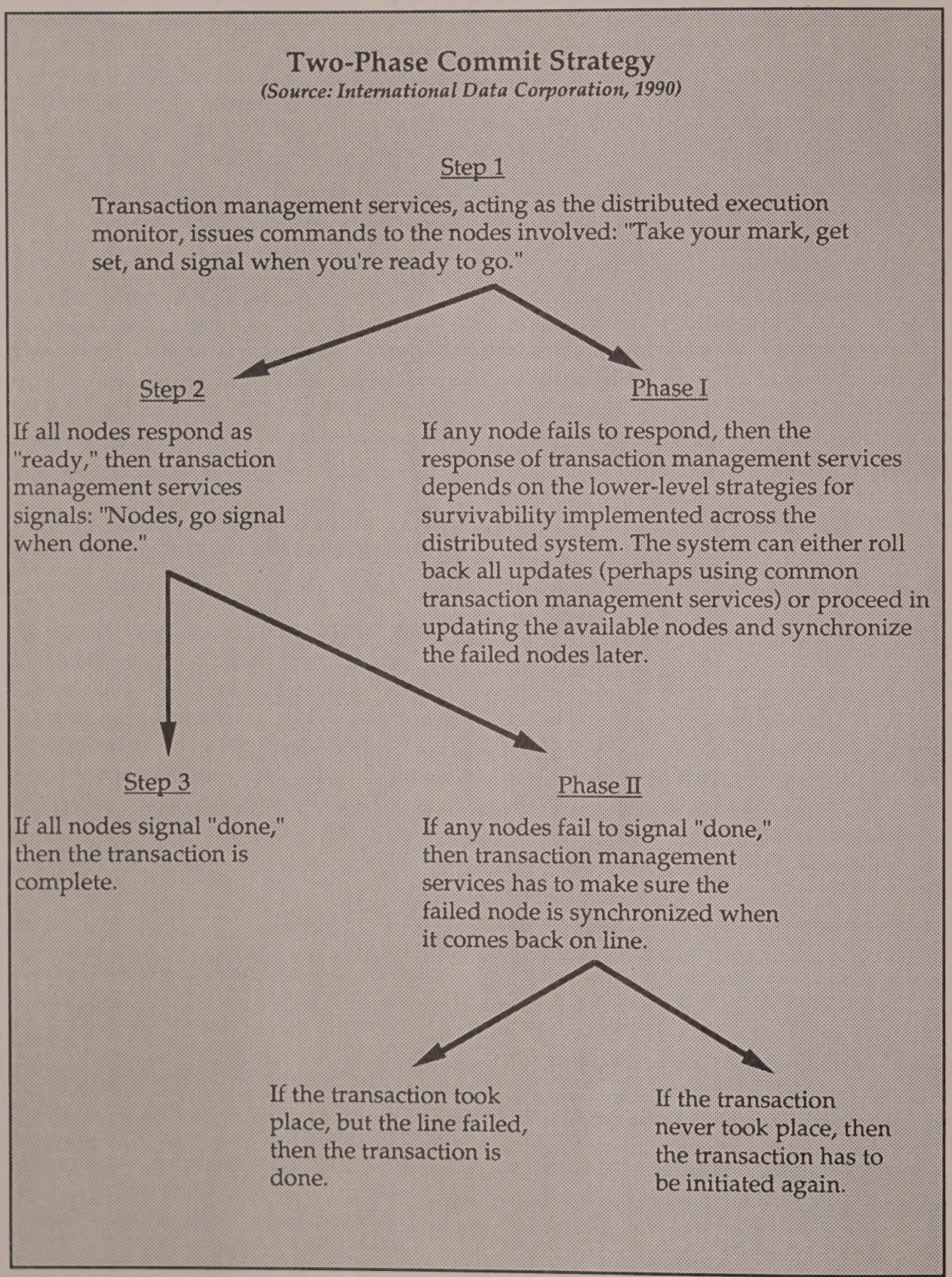
Two-Phase Commit Strategy

(Source: International Data Corporation, 1990)


Step 1
Transaction management services, acting as the distributed execution monitor, issues commands to the nodes involved: "Take your mark, get set, and signal when you're ready to go."
Step 2
If all nodes respond as "ready," then transaction management services signals: "Nodes, go signal when done."
Phase I
If any node fails to respond, then the response of transaction management services depends on the lower-level strategies for survivability implemented across the distributed system. The system can either roll back all updates (perhaps using common transaction management services) or proceed in updating the available nodes and synchronize the failed nodes later.
Step 3
If all nodes signal "done," then the transaction is complete.
Phase II
If any nodes fail to signal "done," then transaction management services has to make sure the failed node is synchronized when it comes back on line.
If the transaction took place, but the line failed, then the transaction is done.
If the transaction never took place, then the transaction has to be initiated again.

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- Using the foundation tools of a software platform, customers will be able to "mass-customize" core components — such as data structures and elements, process specifications, security lists, etc. — into exact solutions. Vendor, user, and contract programmer will all engage in the process of development; again, the ultimate goal is to define the information system in terms of the organization, not to define the organization in terms of the limitations of the information system.

Software Platforms and Competition

Obviously, the provider of the software platform is in a unique cost position; to stay abreast of the platform provider's market moves, all other vendors of computer equipment, services, and software will be forced to burden an added, and costly, risk. Thus, there are other, and less egalitarian, purposes and motivations to the marketing of software platforms: strategic advantage in a maturing computer industry.

Many different flavors of software platforms will emerge, each incorporating vendor-specific twists atop industry standards. These twists will help differentiate a vendor's product, and they will to a certain extent impede progress towards the aforementioned information grid, but for the most part the relationship of each to the vanilla platform will be well defined. Therefore, their relationship to each other will be technologically and organizationally manageable.

The real battle in the computer industry is for the right to propagate industry standards, and thereby control the development of the information grid. Each competitor will attempt to forcefully conscript third parties. The weapon will be FUD — fear, uncertainty, and doubt, a term in the past associated with IBM, but no more. Only those third parties solidly aligned with one platform or the other will be given access to, or better yet the opportunity to influence, its future directions. Nonaligned or opposed third parties will be made aware that their competition is prepared for future developments, that they are incurring an "unnecessary" risk.

Currently, the two principal combatants are IBM defending SAA and Digital defending NAS; but there are other potential entrants: the entire X/OPEN consortium (which includes Digital and IBM), Fujitsu and its Systems Development Architecture and Support Facilities model, and others.

But IBM and DEC have a decided advantage: the ability to confer marketing partnership status on their minions. The opportunity to appropriate either of the giant's distribution systems is sweet temptation to any third party, no matter how much they covet independence. So long as IBM and DEC are able to construct their platforms of proprietary (not Unix) stuff, they will maintain this advantage, and third parties will be pressured to choose.

By Peter L. Burris, Director of IBM Research and IDC's IBM Advisory Service.

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IBM Servers. Despite IBM's significant rebound in the 1989 worldwide PC market, the company still has lacked a solid set of low-end server products. While executives of the company's Application Business Systems Unit may portray the AS/400 as a viable server option, and others may point to the new RS/6000 line as the server saver, IBM still hasn't had a dozen-or-so PC file and device server. With the new Model 80s (complete with SCSI adapters and magnetic and optical storage capabilities), IBM is targeting the low end of the PC server market. Chances for success? While the new servers don't offer the performance of servers from NetFRAME, Compaq or Auspex, they should hold their own on the low end.

Tandem/AT&T. AT&T is trying to tighten the leash on wayward Bell Operating Companies by doing a technology/OEM deal for Tandem's recently-announced fault-tolerant Unix systems. Following the leads of HP/Sequoia and Stratus, AT&T figures it can connect with the telcos by building on their history with Unix and need for 100% uptime (in both online directories and front-end switches). Tandem's 70-plus percent of the fault tolerant market (the *Gray Sheet*, Vol. 25, No. 15, March 16, 1990) doesn't hurt either. The deal casts further shadow on AT&T's love affair with Sun's SPARC — Tandem and AT&T's other big iron partner, Pyramid, both favor the MIPS RISC chip.

Lotus Reorganization. With Lotus's perceived turnaround as easy as announcing a deliverable (the key word here) multiplatform spreadsheet strategy, this week's reorganization may have come as a surprise to some. But the need for greater attention to presales consulting and customer support was clear and well documented (the *Gray Sheet*, Vol. 25, No. 11, January 30, 1990). While Lotus is capturing significant attention merely by announcing a new strategy, the reorganization puts some weight behind the words, and adds significant muscle to what will no doubt be a long, hard struggle.

Still Not a Workstation. Apple is positioning the new Macintosh IIfx as a general-purpose computer for a broad range of applications from "spreadsheets to rendering." It's a good try at tapping high-tech, high-price engineering, design, and publishing workstation markets, but the strategy is still unfocused. Until Apple sheds the habit of calling products like the IIfx a "high-performance PC" and admits it is indeed in the workstation market (and faces workstation challenges), its high end is doomed to mediocre success.

On the Rocks. Data General's big U.S. Geological Survey contract (5,700 Aviion workstations, 300 servers) was rejected by the GSA upon appeal by another contractor that was found to have been improperly excluded from the original competition. The 88K's not out of the woods yet.

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Digital's Trojan Horse Lurches Forward: Revisiting OLTP With DECtp II

Digital's first cohesive foray into transaction processing (TP) markets, the July 1988 DECtp announcement, was nothing if not a strategic move. DECtp represents the company's primary efforts to find a reasonably long-term commercial role for the VAX architecture and VMS.

Digital has now delivered the second phase of distributed TP with a fault-tolerant (FT) VAX, and an array of new and enhanced software offerings. Pieces of its product puzzle fall into place, and Digital's Trojan Horse TP strategy — as well as some hedged bets — is clarified:

- Timing: Digital intends to offer distributed, relational, high-level language database as an alternative to DB2 as mainframe users consider replacing hierarchical or flat-file databases with a relational replacement. Crucial to the strategy are Digital-expounded beliefs that distributed data is potentially more secure and evolvable than centralized data.

- Mainframe-able: The VAX 9000 serves two functions in DEC's TP gamble: it differentiates DEC from a slew of smaller TP players, and it provides a way out if distributed TP is not the way of the future by providing a seemingly robust high end to house massive centralized databases. In this context Tandem, which pioneered in distributed SQL-based OLTP solutions, is now trying to move into the data center.

- Demonstrated Commitment: Digital understands that evolving solid TP products takes time. Rushing to fill the TP-void with short-term fixes would have been disastrous. Cracking into the glass house takes more: great technology, solid products, and the perception of long-term commitment.

Systems vendors — struggling to match historic growth rates — view TP and fault-tolerance markets as saviors because of their higher growth rates and margins. Digital is no different. Only it is also hoping to crack into commercial glass houses.

The DECtp II announcement puts Digital closer to its stated goal of TP market leadership. However, challenges remain: evolving VMS into a true FT operating system and developing proprietary 4GL distributed database tools. And then, of course, it must convince users that distributed is better, and that Digital really does have it.

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MIS-Perception: DEC's TP Allure

Why are transaction-processing and fault-tolerant systems markets attracting Digital's attention? Sure, growth and margin opportunities tell the story for most TP wannabees, but for Digital the chance to effect a radical, strategic shift into commercial accounts lies behind the TP posturing.

The numbers themselves are impressive. Between 1984 and 1988, the worldwide market for fault-tolerant (FT) hardware grew at over 25% compounded annually, while overall midrange market growth averaged 6%. The opportunity for systems tuned for OLTP applications is approximately 20-30% of the midrange market, or up to around $10 billion in 1990.

And while hardware vendors feel a downsizing-inspired margin crunch, vendors of FT systems are less susceptible to decreasing profitability because of the additional value attached to their systems. Customers are willing to pay more when the application absolutely must keep running.

But Digital's stakes are higher. By offering a viable, distributed TP alternative to IBM, Tandem, et al., Digital is hoping to change how the company itself is perceived by potential buyers of Digital product and thereby position itself for previously inaccessible markets.

The problem is that no matter what it says, no matter how hard it tries, Digital is still seen largely as a product company and not a solution company. If it is ever to seriously challenge IBM's absolute dominance in MIS shops worldwide, Digital recognizes that it must first change that MIS-perception.

So why TP? What better way to present commercial solutions ability than raw transactions? Debits, credits, units of inventory: that's the language of business. TP is Digital's Trojan Horse.

For Digital, TP is more than just incremental revenue. It's wholesale repositioning. By pushing TP into the MIS data centers, Digital hopes to make the shift toward being perceived as a more serious vendor of commercial systems.

Digital's Risks

But the shift is not without risks. User organizations are rigidly structured around centralized TP systems. And IBM views any attempts at disrupting its carefully sculpted TP presence as full-scale war. If Digital is to succeed it must convince users that distributed is better.

So far that hasn't happened. IBM's lock on centralized data is tight. As a result, Digital is carefully positioning the VAX 9000 in TP mode on a centralized/distributed fence. It can go either way.

In fact, the DECtp II announcement is built on the high-throughput OLTP-mode Digital Distributed Transaction Architecture network which has been renamed "Digital Distributable" because DEC really has recognized that not everyone wants distributed!

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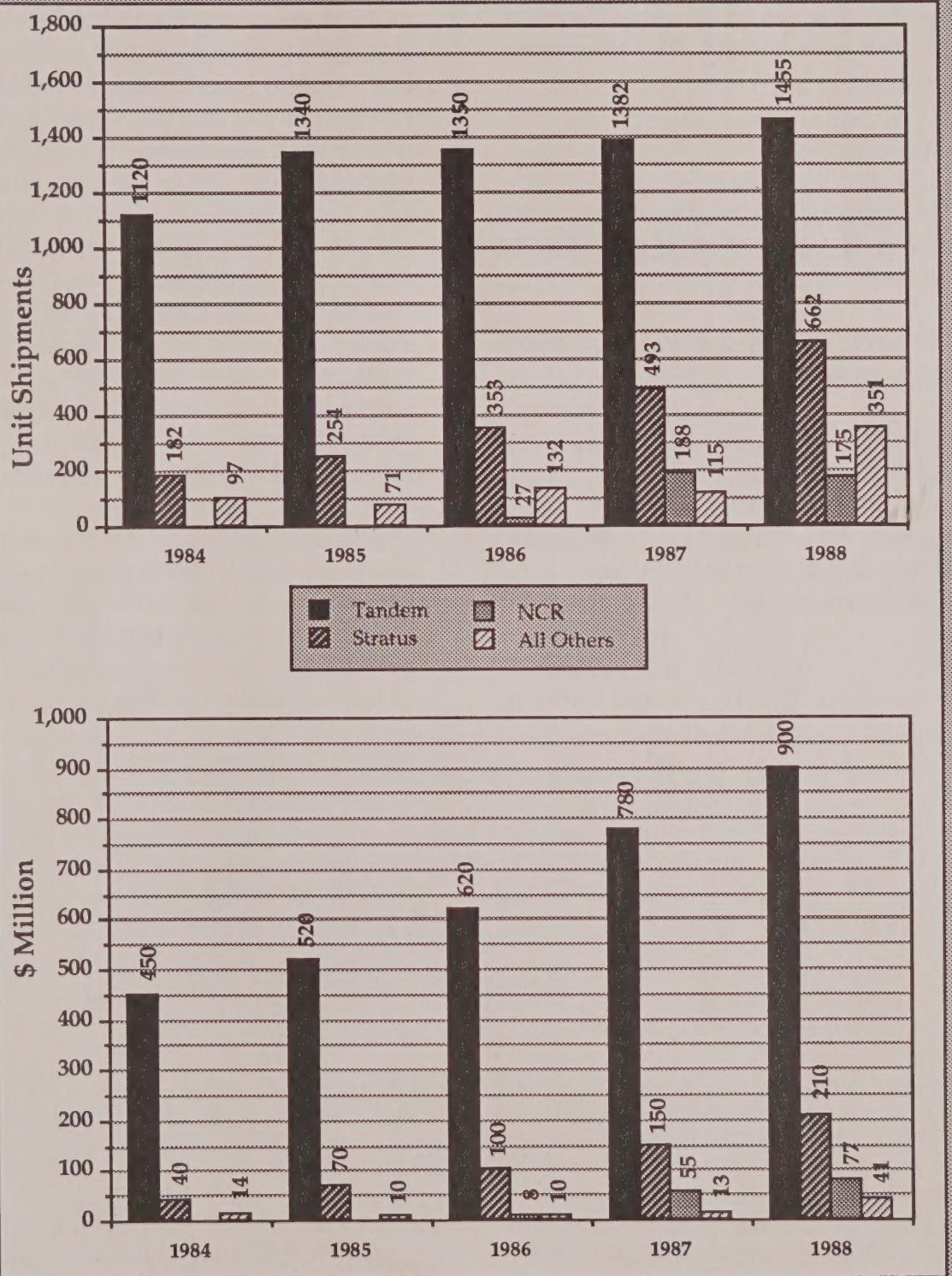
Worldwide Fault Tolerant Market, Unit Shipments and Revenue ($M) of U.S. Based Vendors, 1984-1988

(Source: International Data Corporation, 1990)



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Transaction processing is one thing. Distributed TP is another. While building a strategy shift around just TP would be a little simpler, it would offer Digital little in the way of differentiation from strong TP players IBM and Tandem. Hence the distributed TP announcements.

DECtp II

Last week's announcement improved on DECtp, announced in July of 1988, in four ways:

- Embedded TP support in the VMS operating system
- Enhanced DECtp monitor and database capabilities
- The first in a family of fault-tolerant VAX systems, the VAXft 3000
- New TP-oriented CASE tools

While the VAXft 3000 will attract the most attention, the TP-related software announcements are a cornerstone of Digital's long-term strategy.

Pricey Hardware

Two versions of the VAXft 3000 are initially available: an entry-level two-box system, and an expanded four-cabinet system that provides substantially greater mass storage at a substantially higher price.

Each box, or "zone," contains a CPU module equipped with two CVAX processors (making the VAXft 3000 the only known example of the much-rumored multiprocessor MicroVAX). VAXft-specific VMS system services ensure that fault-tolerance is transparent to VMS-layered and applications software.

Storage limitations of the entry-level systems — 381MB (shadowed) when fully populated — make it a poor candidate for real-world applications. The expanded configuration supports 1.9GB (shadowed) at $48K per 32MB of disk storage.

Defining Transaction Processing and Fault Tolerance

Transaction-processing (TP) systems are highly interactive production systems that generate revenue and maintain or enhance an organization's competitive position. Transaction-processing applications offer fast response times and high availability to a large number of users accessing a shared database with high data integrity.

Fault-tolerant (FT) systems are hardware and software systems specially designed to prevent to the greatest extent feasible any unplanned downtime (through the failure of the CPU, disks, etc.) and to maintain complete data accuracy and integrity during processing.

Increasing hardware reliability is driving multiuser systems toward "virtual" fault-tolerance. With uptimes averaging around 99.5%, some may argue that the market for completely FT systems will eventually disappear. *The Gray Sheet* disagrees. More and more OLTP applications are viewed as mission critical. Even if hard failures only occur a handful of times every year, the transactions they disrupt could cost millions. True fault tolerance combines software functions protecting the integrity of each transaction. While increasing reliability can, and should, force users to think long and hard before paying the fault tolerant premium, it will never precipitate the demise of the fault tolerant system vendors.

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Kindler, Gentler VMS 5.4

The new VMS 5.4 supports all VAXs, including the VAXft 3000 and the VAX 9000. It incorporates embedded TP support through the two-phase commit protocols of Digital Distributed Transaction Manager (DECdtm).

A key component of the Digital Distributable architecture and strategy, DECdtm works in conjunction with DECtp resource managers to provide distributed transaction processing and data integrity across multiple DECtp databases and monitors.

A Slew of Software

In conjunction with the VMS 5.4 release, Digital announced DECdtm-compatible TP monitor and database releases, two tp-oriented application development tools (DECtrace and RdbExpert), and DECscheduler, a VMS queue management tool.

The two functionally equivalent Digital TP monitors, VAX ACMS and DECintact, offer unique development environments. Developers can choose the structured, 4GL-like programming approach provided by VAX ACMS, or the 3GL (and CICS-like) approach offered by DECintact's TP-related services. ***The Gray Sheet*** anticipates that Digital will offer a single, unified DECtp monitor in 18 to 24 months.

Like the DECtp monitor duo, the new DECtp database releases (VAX Rdb/VMS version 4.0 and VAX DBMS version 4.2) support the DECdtm facility. In addition, the new Rdb/VMS database provides C2-level security, a boon to Digital's competitive stance in security-conscious markets (government contract customers already account for 25% of domestic Rdb/VMS sales).

CASE Tools

Two new CASE tools complemented the DECtp software upgrades. DECtrace, an application performance monitor, enables developers to collect and report information for use in tuning DECtp databases as well as VAX ACMS and ALL-IN-1 applications.

DEC RdbExpert is an expert system-based physical database design tool that analyzes database logical design as well as transaction workload, data volume, and system environment information to generate high-performance DECtp databases that can be optimized for their specific applications. The choice of "DEC" instead of "VAX" in the product's name portends future non-VMS implementations.

Finally, Digital debuted DECscheduler, a commercialized version of an internally-developed distributed application that upgrades the capabilities of the VMS batch queue facility.

Courting Customers

Based on its expansive definitions of TP, Digital regards virtually the entire computer user community and application spectrum to be DECtp opportunities. It's TP monitor prequalification criteria, however, indicate that applications supporting more than 10-15 users who share data via predefined menu functions, and in which security, availability, integrity and distributability are critical

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issues, make the best candidates for DECtp software.

In addition to such TP mainstays as point-of-sale, and airline reservation and automated banking systems, Digital has identified financial trading, insurance, telecommunications, emergency dispatching, air traffic control, and inventory management applications as DECtp targets.

User Concerns

Users considering moving to relational-database TP solutions often must make a straight forward (but sticky) decision: centralized (characterized IBM), or distributed (Digital).

While choosing IBM is often seen as the easy way out, it also may make good business sense. Increasingly, the cost of information solutions is software and service related. Why decentralize (and fragment IS staffs) when scale economies reduce costs of centralized installations?

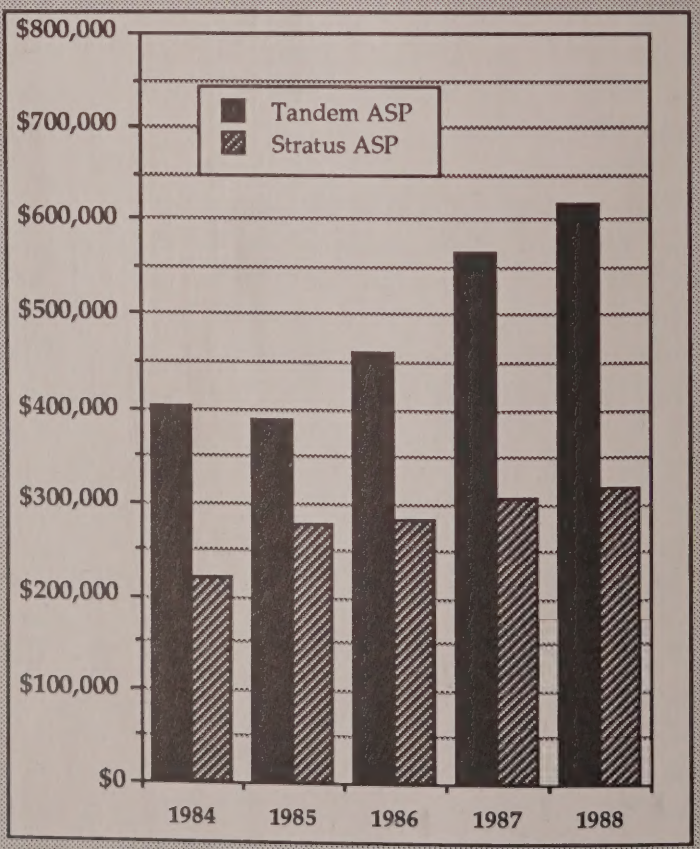
IBM still snares the lion's share of TP business for at least one good reason: it knows TP. The data availability and security features built into VSAM and other MVS subsystems are rock solid.

But welcoming Digital's TP Trojan Horse into the inner sanctum — glass house or otherwise — need not involve attacking footsoldiers.

Tandem and Stratus Average Worldwide Selling Prices, 1984-1988
(Source: International Data Corporation, 1990)

One reason for interest in the fault tolerant market is the success of both Tandem and Stratus. While the overall size of the FT market grows, size of FT installations are also growing, attracting attention from above and below.

(Note: Systems are complete processing hardware units, including CPU(s) and basic peripherals. Multiprocessor configurations are counted as single systems. Tandem figures include all multiuser system shipments except the Unix (non-fault tolerant) boxes OEMed from Altos. Stratus figures include direct sales plus systems resold by IBM, Olivetti and international distributors.)



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Digital has assembled an impressive set of architectural availability and security safeguards. And the evolvability of distributed databases is much simpler since restructuring them is a far less daunting task than restructuring massive centralized databases.

Conclusions

Some positive and negative aspects of the announcements:

Positives

- DECtp's strong suit is the ability to reduce the cost of a distributed mission-critical TP application by delivering fault-tolerance only to those portions of the application that require the highest levels of availability. Pick-and-choose flexibility will ultimately bring Digital's FT solutions into very competitive per-transaction price ranges.

- Digital is building on an "in it for the long run" commitment. The failure of FT start ups lends credibility to the assumption that only established players like Digital can make it in potentially mission-critical TP applications markets.

- Digital is the only vendor that offers immediate FT capability to such a full suite of applications, since no rewriting of standard VMS programs is necessary to take advantage of fault tolerance.

- Digital has done well to avoid falling into thr trap of introducing an unfocused general-markets FT strategy.

Negatives

- Despite the addition of two-phase commit, VMS is not yet the fully fault-tolerant operating system that Tandem's Guardian and Stratus's VOS have become.

- The VAXft 3000 is not a price/performance leader. In fact, it is competitive on neither price, nor performance (the Stratus XA200 Model 30 offers 152MB and 9TPS for one-fourth the cost of an entry-level 3000).

- Ultirx was conspicuous in it absence. FT Ultrix would give third parties like Oracle (which plans its own 2PC capability by Q4 1990) database — and therefore account — control, whcih may explain its absence. But whatever happened to the pledge that both VMS and Ultirx would be available on every system ?

- The entry-level VAXft 3000 (starting at $229K) is a teaser model designed to lure users into the Digital fold. What honest FT application can squeeze by on only 381MB of mirrored storage? Despite future upgrade ability (available by year end 1990), users are well advised to purchase the extended model.

- Digital still needs CASE tools for designing and developing distributed applications if it is truly serious about offering distributed solutions.

With Terry C. Shannon, Director, Digital Advisory Service.

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Olsen's Edsel. At the DECtp rollout in Paris, Digital president Ken Olsen cited the PDP 11/74 to support his contention that the VAXft 3000 was not the firm's first fault-tolerant system. The statement failed to elicit any response from the audience, which was probably just as well: citing the PDP 11/74 as an example of fault tolerance is analagous to citing the Edsel as an example of automotive excellence. The quadprocessor PDP 11/70 was designed to address the high availability requirements of the telecommunications industry. However, it failed to achieve product status because of problems encountered during field tests of prototype systems. One such system remains in use today — in a strictly non-fault-tolerant capacity — by Digital PDP 11 software developers in Nashua, NH.

Motorola RISC Minis. Motorola recently started spending some of its $300 million advertising money and, by the way, also introduced a new line of Unix 88000 minis. The 3-to 16-user systems are aimed squarely at IBM's RS/6000. While Motorola's 88000 mini customers Unisys and NCR won't be exactly pleased, the announcement but might raise more ire at Data General, whose Unix distribution channels are somewhat less solid. Unless someone starts developing software for the 88000 (Motorola, for its part, spent about $15 million in porting fees), there will be little with which to halt the Intel and SPARC RISC momentum. Motorola told *the Gray Sheet* that it could be quite happy — and profitable — with a half-billion dollar computer business, which in itself will take some doing. Of course, compared to the cost of the ad campaign ...

Together Again. With Businessland again plying Compaq's wares, NCR's status must be up in the air. While the largest reseller of LANs must be tempted to sever its relationship with NCR and cut inventory and selling costs, that move might send the wrong signal to its customer base. The last thing Businessland needs is customers demanding more discount points because of the retailer's perceived instability.

What Goes Around ... AT&T and NEC announced a semiconductor deal in which AT&T gets NEC gate array technology in exchange for access to its proprietary CAD tools. AT&T will also manufacture NEC microcontrollers, allowing Japanese companies to say they bought them from an American company, although they'll be built in Singapore or Bangkok. NEC was founded 90 years ago as a joint venture by AT&T's Western Electric subsidiary.

Job Churn. The Association of Outplacement Consulting Firms states that staff reductions at computer and computer-related companies are fueling the 15-17% rise in outplacing industry volume. That may be so, but experienced engineering personnel remain in tight supply at many smaller reseller, service and support organizations. Job churn shouldn't be confused with employment malaise.The jobs are simply following the market, which makes outplacement consulting firms very pleased indeed.

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IBM RS/6000 Analysis, p.7

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More Than Just MIPS: Riding the Workstation Wave

Enormous price/performance leaps are testing the boundaries of the single-user system market.

Workstation vendors, showing off huge amounts of raw power, hurl their products up against heartier minicomputers. Others price theirs below $10,000, port popular PC applications like 1-2-3, and go for the low end. Others still do both, even in light of conflicts with older, more expensive and highly profitable lines of multiuser systems.

Is this new breed of networked, single-user system a technical or personal workstation, a business machine ... or just a brawny PC?

Any way it's sliced, the single-user, $8,000 to $100,000 system market is soaring. Created in 1981 by Apollo and legitimized in 1985 by Sun, between 1986 and 1988 sales of U.S.-based vendors roared at over 110% annually to almost $4.5 billion in 1988.

However, even a rising tide — in the form of a 50% annual revenue growth rate through 1993 — might not lift all workstation products. While "hot boxes" are deemed so because of blistering performance specifications, regular price/performance leapfrogging makes competing on technology a short term selling advantage.

IBM (see the analysis of the RS/6000 on page 7) and established competitors alike ought to note the following workstation warning signs:

Demand Considerations:

- Despite wild price drops and performance leaps, distinct price band segmentation remains highly visible. Users seem to overwhelmingly spend workstation dollars on low-cost desktop systems. The average selling price (ASP) is expected to drop from over $20,000 in 1988 to $12,000 in 1993. While entry-level and low-end workstation systems accounted for less than 65% of 1988 units, by 1993 they will account for almost 90%.

- Workstation vendors are trying to ride a wave out of the lab, across the trader's desk and into commercial (corporate) America. By 1993, 32% of workstations in the U.S. will be sold for commercial applications.

Supply Considerations:

- The growth of commercially viable Unix, combined with price/performance breakthroughs, spells trouble for system vendors with

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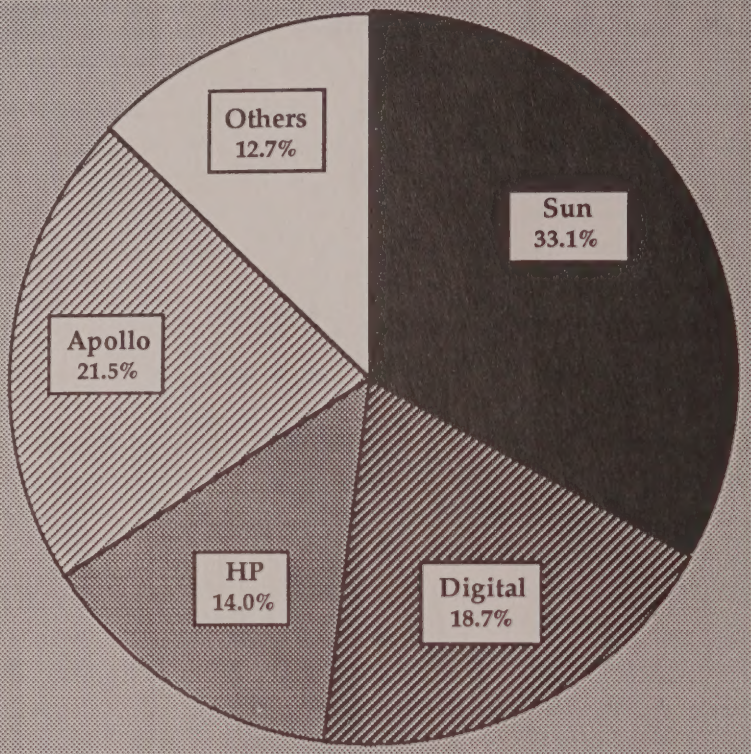
Worldwide Workstation Installed Base of U.S.-Based Vendors, Yearend 1988

(Source: International Data Corporation, 1990)

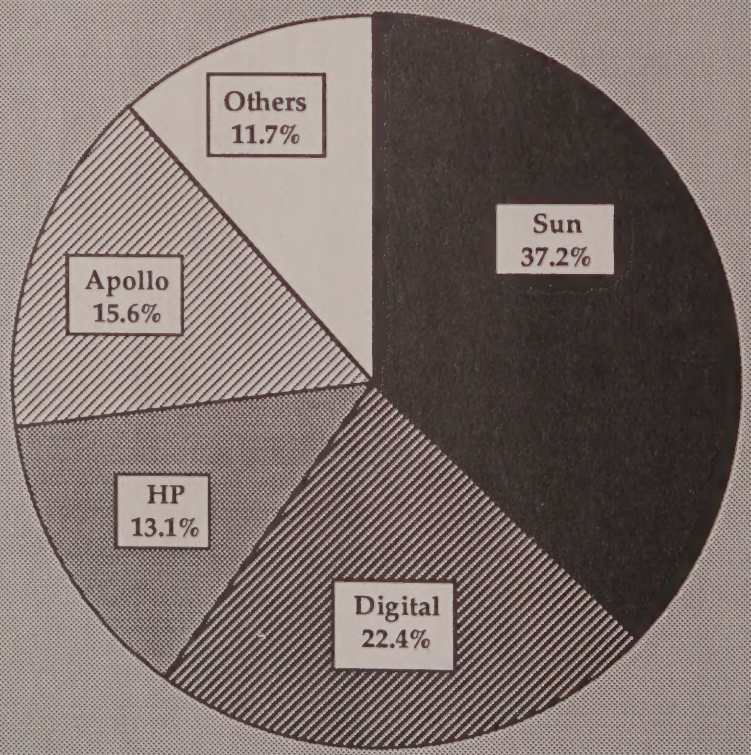
Vendor	Units
Sun	127,975
Apollo	83,010
Digital	72,500
HP	54,200
Others	48,905



Worldwide Workstation Unit Shipments of U.S.-Based Vendors, Calendar 1988

(Source: International Data Corporation, 1990)

Vendor	Units
Sun	68,975
Digital	41,600
Apollo	29,010
HP	24,275
Others	21,694



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workstation products. Leaps in workstation performance pose a threat to small- and medium-scale systems vendors by undercutting system prices. Declining ASPs means declining profit margins. History indicates that systems vendors pursuing a strategy based on declining ASPs are slowly weakening their competitive position (Wang, DG and others).

- Workstation clone-makers, with PC vendor-like cost structures, will drive prices further down. Already, seven Asian vendors have licensed Sun's SPARC architecture (one is shipping, three are committed to shipping, and another three are rumored to be considering shipping).

- Meanwhile, PC vendors lie in wait. While building low-cost PCs is an asset management game, IBM, DEC, and HP are still struggling with streamlining unwieldy — and expensive — infrastructures in the age of downsizing.

Recommencement of the workstation wars has just begun. The skirmishes will heat up when the RS/6000 hits full stride. New and established workstation vendors alike will play systematic price/performance leapfrogging games while confronting regular margin pressure. Success for IBM's RS/6000 will come, in 12 to 18 months, after IBM sheds its negative workstation image and secures momentum and presence in the market.

Other vendors' workstation business will also grow — in rapidly expanding markets even second-tier products sell. But they will all lose share to IBM, which will grow faster than the industry average. Yet three types of questions remain:

Distribution Questions

- Standardization, declining workstation prices, and regular performance leaps have created a distribution dilemma — the workstation market's billion dollar question. Will direct channels be able to support less-profitable sales of low-end workstations? Or will retailers, so far unable to demonstrate ability to play to the workstation audience, pick up the low-end slack?

Structural Questions

- Even more fundamentally, how can companies competing in the workstation market on the basis of declining ASPs prosper without cannibalizing more profitable systems sales? And can PC vendors, without support infrastructures, low-ball the market with less expensive workstations?

Application Questions

- Because software drives the sale, are existing commercial applications enough to drive workstations out of the lab? Or will a "killer application" emerge to fuel growth into commercial markets?

In the workstation market, appearances are deceiving. Convention is regularly rendered obsolete by the pace of change. Likewise, that same pace is overrunning the Maginot lines which define the interests of industry stalwarts.

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Workstation Leapfrogging

Regular price/performance improvements are a staple of other segments of the computer industry: PCs step through successive generations of 80X86 chips, and users are rewarded with incremental performance improvements. System/370 users likewise step through similar increments which keep them inching toward IBM's high-end architecture and strategy.

Price/performance breakthroughs in the workstation market, accelerated by a greater proportion of use of RISC technology than other market segments, are particularly significant. For one thing, they have direct impact on unit sales. The workstation market is expected to total 1.4 million units by 1993, up from 180,000 in 1988.

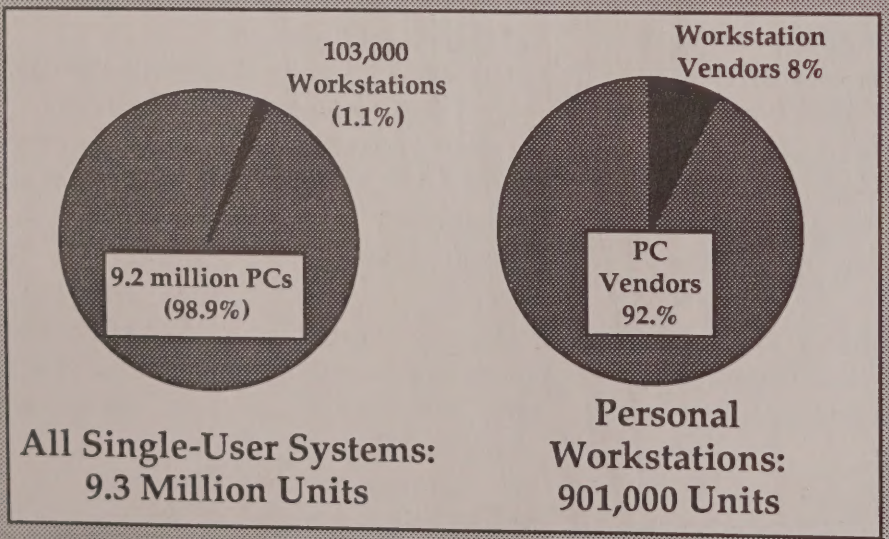
For another, prices will drop more rapidly than in other segments of the computer industry. Annual doubling of state-of-the-art performance is the rule, according to Sun.

As a result, competing in the long term on price/performance necessitates some sacrifices. It involves either an inefficient cost structure that allows rapid ramp-ups and -downs, and a marketing strategy that outdates itself every six months or so. While it's not impossible, it's a basis for competition that most vendors view as overly expensive and risky.

Finally, changes in the workstation market don't stop there. Technological leapfrogging affects a basic premise of the workstation industry: that technical

Slicing Up the Single-User System Market: U.S. Unit Shipments of Workstations and Personal Computers, U.S.-Based Vendors, 1988

(Source: International Data Corporation, 1990)



Traditional PC vendors, as opposed to workstation vendors, dominate a new subsegment of the single-user market: personal workstations (PW). A PW has three distinguishing characteristics: a 32-bit CPU, an end-user price tag of no more than $20,000, and a single-user configuration. True 32-bit processing, as defined by the operating system, makes PWs from workstation vendors more powerful than their DOS- and OS/2-based counterparts from PC vendors. However, PWs from PC vendors are typically less expensive than PWs from workstation vendors.

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users require single-user systems. Systematic, RISC-based improvements providing multiuser performance at PC prices press workstations into competition with small- and medium-scale systems at the top of the workstation line, and high-end PCs at the bottom.

Selling more capable workstations into those markets raises at least two fundamental strategic questions. Vendors need to determine when the workstations start cannibalizing their own system sales. And they need to determine the level at which they can support larger, critical applications.

Taking Over the Desktop

A cornerstone of workstation vendors' efforts to grow is the development of commercial markets. While commercial sales of workstations represents a tiny portion of today's sales, they are the largest growth opportunity. Over 80% of all PCs run commercial application software.

But it's not a simple task. Vendors' sales teams, more acquainted with selling into technical markets, face obstacles getting in front of customers. And, once there, they must compete against increasingly capable and less expensive PCs.

IBM is moving in the other direction. Initially, it expects fully 65% of RS/6000s to go into commercial applications. Within two years it hopes that its sales are 60% technical and 40% commercial.

IBM's ubiquity in commercial accounts, and historical lack of successful technical products and marketing teams, explain the trend. In addition, porting character-based commercial applications to the RS/6000 platform is simpler than porting technical applications.

"Killer" Applications

But expecting current run-of-the-mill commercial applications to spawn a new market for workstations is wishful thinking. With PCs running spreadsheets, word processors and database programs at blinding speed, users see little incentive to spend the extra $5-10K on workstation hardware.

Gauging the rate at which workstations will seep into commercial markets invokes the possibility of a "killer" or "beachhead" application. Citing the rapidity with which spreadsheets like Visicalc and 1-2-3 drove PCs into the office, vendors planning for the commercial onslaught hope that such an application will put a workstation on every desk.

Likely killer apps, they indicate, are a mixture of desktop multimedia, computer-based training systems and ISDN (see *the Gray Sheet* 25:9-10, January 16, 1990), or a practicalized permutation of VPL's "artificial reality." While videoconferencing has some very specific benefits, they are not completely apparent to most corporate users. The similar, yet more dramatic, benefits of desktop multimedia will also be greeted with hesitation.

The Distribution Dilemma

The major challenge for workstation vendors is distribution. The question,

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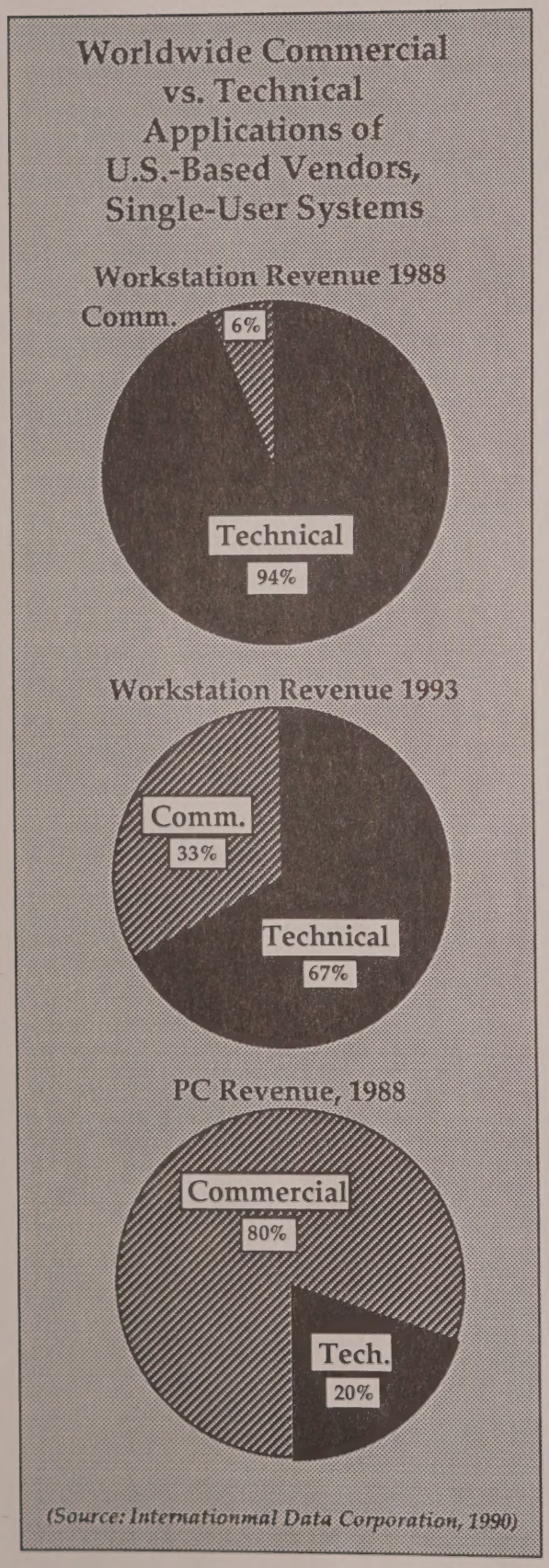

simply stated, is can vendors survive selling workstations through direct sales teams if prices keep falling and performance increasing at current rates?

Regardless of whether vendors seek to sell into technical or commercial single-user markets, they have at least three options: sell direct, sell to VARs (which add value by packaging the system with proprietary application software), or sell through the distribution channel.

Direct sales teams require an expensive infrastructure. While Sun has profited handsomely from its direct sales of low-end Sparcstations, continued downward margin pressure may render direct sales of low-end workstations too expensive. Sun and other vendors may enlist the help of alternate distribution channels of economic necessity.

Value-added resellers provide vendors a less expensive sales reach into vertical markets. However, few VARs provide and support high-end, technical applications that require workstations. The commercial markets with which they are more familiar will not begin to develop for workstations for another 12-18 months.

Retail dealers offer vendors the least expensive distribution, but at the cost of technical expertise and vertical market penetration. Whereas VARs typically must have some sort of successful support mechanisms, retailers do not. When margins get tight, they cut back on support. And margins in the retail business have been tight, and getting tighter, for years.

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standards-setting efforts. ***The Gray Sheet*** doesn't think the RS/6000-AIX 3.0 combination is a Trojan horse for the Unix industry.

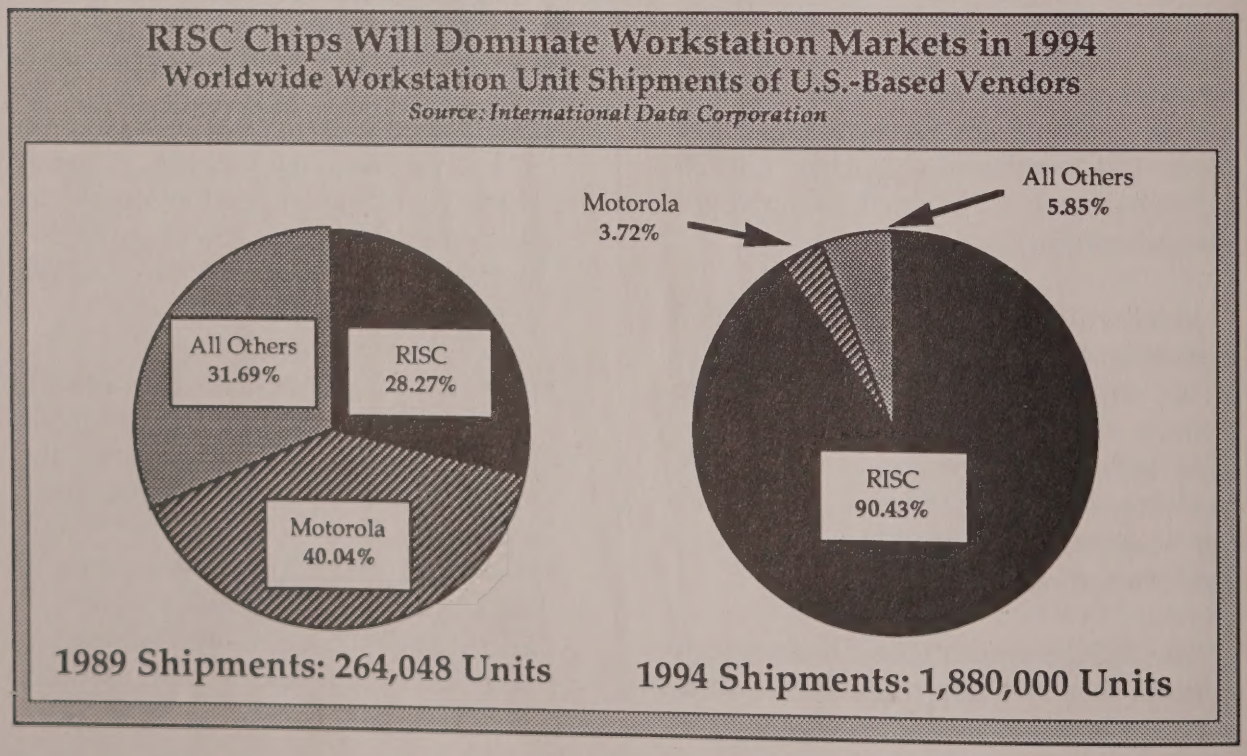
We can't say that IBM will be more willing to compete on the basis of price/performance and openness in areas where its SAA platforms dominate, but we can say this: IBM will behave as though its corporate life depended upon being a leader in the Unix technical workstation and commercial markets — which is good, because it may.

The RS/6000 Systems

The RS/6000 is a superscalar machine, capable of dispatching and executing more than one instruction per cycle. By spreading execution of compiler-optimized code across six asynchronously functioning processing units, the RS/6000's low-cost CMOS engine can generate 27.5 MIPS at a machine cycle rate of 20MHz. Larger machines, built with more data cache, additional system buses, and faster cycle times can perform more than 41 MIPS.

IBM calls this advanced CPU "POWER," which stands for Performance Optimized With Enhanced RISC. Unlike many computer industry acronyms, this one actually has relevance.

The POWER architecture embodies a second-generation RISC design. While retaining most RISC principles, such as simple instruction formats — primarily load/store instructions for moving data, many general-purpose registers, hardwired instruction set, and a heavy reliance on optimizing compilers to minimize pipeline delays caused by branches — IBM in some cases violated



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traditional RISC thinking to achieve greater throughput.

For instance, the POWER architecture defines 184 hard-wired instructions, a larger set than even HP-PA's 140 and far larger than the RT PC's 118. Moreover, it was developed to realize not only the traditional RISC goal of minimizing the time required to execute instructions, but also the traditional CISC goal of shortening program path lengths. Thus, POWER includes some more complex instructions, a few of which are elaborate enough to require multiple operands and operations. (For additional technical information, see IDC Report #4652, RISC System/6000: Technology Overview).

The result is a very powerful machine implemented using a low-cost, semi-custom CMOS process. We believe significant performance headroom exists in both the POWER architecture generally and in IBM's CMOS technology specifically. Over time, IBM will continue to enhance POWER to support more execution units (e.g., multiprocessing) and use CMOS technology to build faster CPUs featuring much higher chip densities.

Although to maximize architectural integration IBM chose not to go to the merchant RISC CPU market for its engine, in other areas it has made extensive use of standard hardware interfaces and off-the-shelf hardware. Three examples stand out. 1) The RS/6000 is a Micro Channel (MCA) machine. Although it implements MCA Level 2 (i.e., supports 40MBps data transfer rates), almost all PS/2 MCA adaptors will operate on the RS/6000. 2) The RS/6000 is also the first IBM product to prominently feature the Small Computer Systems Interface (SCSI) Level 1 specification for attaching the mass storage subsystem. 3) As for off-the-shelf devices, two of the featured disk options are OEMed from Maxtor: the 355MB and the 670MB drives.

IBM has implemented the POWER CPU in nine basic configurations of the RS/6000 family: four POWERstation models and five POWERserver models. The server versions of POWER generally bundle more memory, additional SCSI adaptors, 1/4" tape for save/restore, and the base AIX software, but not, like the stations, a monitor, diskette drive, mouse, or graphical user interface software.

For their respective price classes, all models can be configured with large memories. Using 1MB DRAM technology, the larger machines can include up to 256MB of memory. When IBM's 4MB DRAMs are widely available, the RS/6000 family will support up to 512MB of memory.

The CPUs in the two smallest models of both the server and station series, the 320 and 520 units, are built with a slightly scaled-down version of POWER. Each of these machines are characterized by less data cache, a smaller data cache line size, and fewer paths connecting the functional units.

Two "specialty" machines are among the nine introduced. The POWERstation 730 is IBM's entrant in the high-performance graphics workstation market. Its uniprocessor graphics performance, as measured in 3D vectors/

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second, 3D polygons/second, and double-precision MFLOPS, compares very favorably to much more expensive multiprocessor machines from Silicon Graphics, Stardent, and HP/Apollo.

The other specialty machine is the POWERserver 930. The 930 is housed in IBM's standard 1.5 meter rack and features drawers for DASD, tape, CD-ROM and other I/O devices. In all, it can be configured with up to 11.9GB of disk storage and, IBM claims, can support up to 250 users.

In addition to the POWERsystems, Big Blue has introduced its first X-terminal. *The Gray Sheet* believes the Xstation 120 was developed only shortly before announcement. Nevertheless, we believe it is one of the most flexible X terminals currently available. It features numerous monitor, memory, and networking options, including both 4MBps and 16MBps token ring. Finally, it includes serial/parallel ports for attaching local printers.

AIX 3.0

By far, the most important aspect of the most recent release of IBM's Unix implementation, AIX 3.0, is this: it looks, smells, and behaves like vanilla Unix.

IBM went to great lengths (and, we believe, spent a great deal of money) incorporating all the technologies necessary to conform to the Unix market's most important standards. AIX 3.0 is designed to subscribe to interface definitions like IEEE's POSIX 1003.1 and FIPS Publication 151. Additionally, Big Blue appears to have successfully merged most functions found in the heretofore largely inconsistent AT&T System V and BSD 4.3 worlds. AIX 3.0 is a superset of each. Functions not merged are provided in libraries.

To improve AIX's networking capabilities in the Unix world, IBM is introducing or promising support for critical Unix networking standards, including Ethernet, TCP/IP with Tahoe extensions, X.25, SNMP, and OSI.

Two graphical user interfaces are initially receiving a great deal of marketing attention from IBM: AIXwindows is IBM's version of OSF's MOTIF; NextStep Environment/6000 is Steve Jobs's NeXT GUI for the RS/6000. In *the Gray Sheet's* opinion, AIXwindows will be the more popular.

While complying to standards, IBM has also added value in a number of ways that should translate into competitive advantage. The most important area to be bettered is file management.

The Unix file system is cumbersome and inflexible. Unix files, once created, are difficult to change at the attribute level, but all too easy to destroy. IBM has introduced, and will make available in 4Q90, a feature called the Logical Volume Manager that sits atop the normal Unix file drivers and provides for dynamic file resizing and relocation. Additionally, the LVM furnishes disk mirroring services to improve availability.

AIX/SAA Interoperability

The market has been most suspicious of IBM's commitment to Unix. For in-

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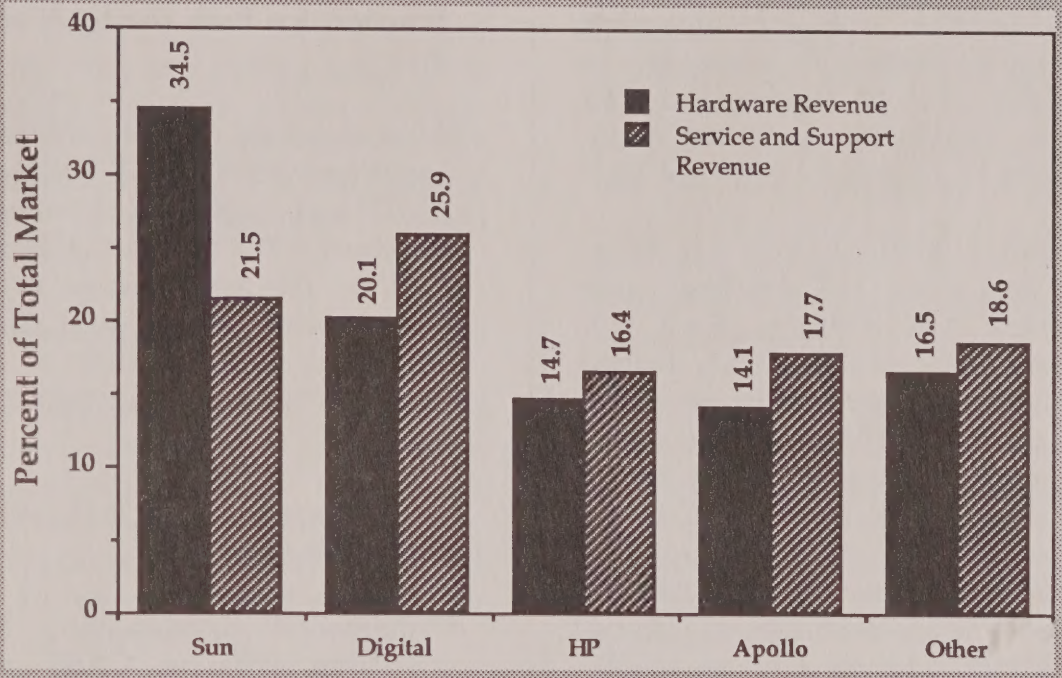
Worldwide Workstation Revenue of U.S-Based Vendors; Hardware and Service Revenue, Calendar 1988

(Source: Internticnl Data Corporation, 1990)



Less than 10% of Sun's revenues are derived from ancillary support services while every other major vendor derives at least 15% from support activities. As a result, while Sun leads in hardware market share (34.5%), it claims only 21.5% of the workstation support market. The widely acknowledged sluggishness of Sun's field service operation may lead to serious problems for Sun when the same users who now wait (up to a week, in one case) for support from Sun consider new system purchases.

stance, when the Open Software Foundation was formed, many espoused the view that IBM was chiefly interested in undermining OSF's ambitious goals.

Whatever IBM's motivations had been, today IBM appears fully engaged in its Unix development, marketing, and sales efforts. One measure of Armonk's Unix commitment is the degree to which it has begun stressing Systems Application Architecure/AIX interoperability.

Henceforth, when IBM makes an SAA announcement, it will detail AIX participation. Likewise, in areas where AIX leads SAA — as might happen in the distributed computing realm — IBM will explain how changes to the AIX family definition impact SAA.

IBM's interoperability message is nearly comprehensive. Areas where either common function, bridges, or Unix system function options will be included are:

- Connectivity. At the protocol level, both environments will receive LU6.2, OSI, and TCP/IP. At the link support level, token ring, Ethernet

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(and 802.3) and X.25 will be offered.

•Network management. Netview will not soon be ported to AIX. Rather, IBM's direction calls for converting problem determination messages in both the TCP/IP (traps) and OSI (events) worlds into a format easily managed by Netview on MVS or VM.

•Distributed database. IBM will deliver at least three AIX databases, one for every AIX platform. Each will conform to the evolving SAA distributed database interface. In designing these databases, IBM's labs are stressing horizontal compatibility across each single platform, rather than exact vertical compatibility up and down the AIX line. Thus, the AIX database for S/370 machines will probably bear stronger resemblance to DB2 than SQL for the RS/6000.

•Shared files. For TCP/IP-based (not primarily SNA) networked computing, IBM has deemphasized a proprietary distributed file mechanism in favor of Sun's Network File System (NFS) protocol. In these non-SNA realms, IBM appears poised to base its client/server computing strategy on NFS.

•Presentation Services. The genius of OSF's MOTIF decision was that it leverages IBM's OS/2 Presentation Manager marketing efforts. Although application programming interfaces will be very different, users used to working in one environment will have an immediate affinity for the other.

•Common Languages. IBM has moved its AIX language development efforts to its Toronto software lab to ensure interoperability between the two application environments. ANSI C, Fortran, and Cobol will receive common function for both the SAA and AIX arenas.

•Mail exchange. Via OfficeVision gateways (provided by ISV Softswitch) to SMTP and X.400, AIX systems on, respectivel,y TCP/IP and OSI networks will be able to exchange mail with SAA systems. Longer term, IBM's direction is to bring over to AIX as much OfficeVision function as possible.

We note two gaping holes in IBM's interoperability strategy:

•Application development. IBM is pursuing different CASE program strategies in the two environments. To build and maintain truly interoperable enterprisewide application systems, we believe developers must have at their disposal interoperable process, project, and lifecycle-CASE tools. We recognize the inherent difficulties of fabricating an interoperable CASE environment, but we believe IBM needs to make some sort of statement of direction on this matter.

•Distributed computing. IBM has joined HP and others in pitching DEcorum to the OSF in response to the consortium's request for distributed computing technology. We believe IBM's AIX strategists will follow OSF's distributed computing lead. What we're less sure about is whether or not the SAA planners will similarly follow. SAA's biggest weakness today is its client/server strategy. Per-

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haps IBM's SAA bigots will follow their AIX counterparts and look to the market for advanced distributed computing technology.

By updating and streamlining its interoperability strategy, thereby strengthening its perceived commitment to AIX, IBM is trying to make it much harder to say no to the RS/6000's price/performance.

Applications Rollout

Of course, no one, not even in the workstation market, buys just technology anymore. Customers' true benchmark is how fast a machine runs a favored application. If the CPU can't run the application, it doesn't even get entered in the competition.

IBM estimates that on announcement day (February 15, 1990) in the U.S. alone 142 software vendors and business partners were building solutions on RS/6000 machines. Big Blue also estimates that by the end of the second quarter, when the machine begins shipping, 256 RS/6000 applications should be ready for consumption (again, in the U.S. alone). By year-end 1990, we believe more than 1,500 applications will be available for the RS/6000 family worldwide.

These are not arcane Unix utility programs either. Among them are many of the commercial Unix and technical workstation markets' leading applications, like Interleaf and SDRC on the technical side and Ingres and Informix on the commercial side. IBM gathered not only quantity when it went picking for applications, but quality as well.

To enlist independent software vendors, IBM has been sponsoring a worldwide AIX Invitational. The Invitational is similar in nature to the ISV program developed for the AS/400 applications launch. IBM's 16 industry marketing groups nominated "best-of-breed" solution providers to participate. Those accepted were given extensive resources, including machines, 2 IBM AIX systems engineers, and secure rooms in locations around the world.

Thanks to the Invitational, IBM was able to guarantee solutions for its box, fuse important relationships, and solicit much-needed expert feedback on the RS/6000's strengths and weaknesses.

Channels

IBM has most of the ingredients for success in the workstation and Unix markets: it has a hot box, it has standard Unix, it has escaped becoming its own worst enemy by tightening its interoperability strategy, and it has the required amount of quality solutions. All that's needed is folks to stir the pot and serve the results.

IBM is not moving the RS/6000 through all channels; notably missing from the list is the OEM channel and, of less importance, the retail channel. ***The Gray Sheet*** believes IBM will rely heavily on Industry Remarketers to help Big Blue make lower-margin sales.

The most important channel is, of course, IBM's massive direct sales force. ***The Gray Sheet*** believes IBM's sales force faces some steep learning curves before they become completely familiar

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with the RS/6000's technology, target markets, and the selling style that dominates the technical workstation market.

Nevertheless, we believe that as IBM's 40,000+ feet begin pounding the workstation/small-systems Unix street in the U.S., marginal players could potentially get trampled. We note that IBM has invested nearly 25,000 days training AIX SEs. Also, significant investments are being made to place over 400 PhD-level talent, folks fluent in the languages of the technical markets, by year's end to assist in the sales effort.

Should IBM decide to pursue the retail channel, the Aggregator program may well be the model it chooses.

AS/400 Positioning

Although IBM's interoperability message should be easily understood by its sales force, old habits die hard; or, you can lead a horse to water, but you can't make him drink. After downplaying Unix for so long, and pumping SAA, IBM may face a situation where the sales force sells what it knows best.

In the midrange what IBM currently knows is the AS/400. Many speculate that the RS/6000 family will cannibalize AS/400 sales. However, the two are positioned in the market differently, have different strengths and weaknesses, and appear to be on very different enhancement paths. IBM will aggressively pursue new business opportunities with both machines. Although, perhaps to not tempt the S/3X installed base in the near term, the RS/6000 will not be fitted with an RPG compiler.

Some Concluding Observations

In summary:

The RS/6000 line sports impressive absolute performance levels. No doubt about it, these machines are thoroughbreds. The 20MHz POWER CPU featured in models 320 and 520 can deliver 27.5 MIPS and 7.4 double-precision MFLOPS, levels that make comparably priced Sun SPARC and DEC MIPS machines look quite sluggish. The 30MHz POWER CPU in the POWERserver 540 can perform 41.1 MIPS and 13.0 double-precision MFLOPS, an N=100 LINPACK rating that places the POWERserver 540 squarely in the minisuper performance range with machines from Convex and Alliant.

The RS/6000 is competitively priced. IBM has nicely placed an RS/6000 member in most of the workstation market's major price bands. The entry-level POWERstation 320 starts at just under $13K. The POWERstation 730 drops into the $60-$70K range. The entry-level server, the POWERserver 320, falls into the low $20K bracket; the 930 POWERserver fits in the $60-$70K multiuser commercial Unix category; and the high-performance POWERserver 540, a machine *the Gray Sheet* believes could be a major player in the technical workgroup server market, sports a $90-$100K price tag.

IBM has begun living in an open standards world. Open is still a four-letter word in Armonk — it is everywhere. But it is no longer regarded as evil, or worse, irrelevant. *The Gray Sheet* believes IBM considered incorporating

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AIX into SAA, but decided against it to avoid the perception that AIX was less than open. We believe IBM will continue to adhere to standards set in the variety of formal and informal bodies populating the Unix space. One strong side benefit of standards conformance for IBM: It will be easier to adopt and subsequently transfer throughout the IBM company innovative technologies developed in the entrepreneurial cauldron that is the Unix market.

A broad line on announcement day. When each introduced its RISC machines, neither Sun nor Digital offered anywhere near the performance and price breadth of IBM's RS/6000 line. IBM can sell the RS/6000 into a broader range of applications at once; customers can assess the systems scalability at once; and solutions partners get an excellent sense of how the line will be organized at once. The RS/6000 could be sold as a workstation, but it needn't be.

Stress the technical market. The workstation market remains among the industry's fastest growth areas. Moreover, this market is home to many of the Unix industry's intellectual leaders, like Sun. By stressing the workstation market, IBM hopes to not only dislodge market share from established players, but mindshare as well. There can be no doubt that IBM would like to see a bit more organization brought to the Unix market. As it does so well elsewhere, IBM is only too willing to provide the leadership. All it needs is followers.

Three Challenges

Still, IBM faces three hefty challenges if the RS/6000 is to be as wildly successful as it expects: sign an OEM agreement, introduce a low-cost (under $10K) entry-level system, and overcome the negative momentum its sales personnel and products have accrued in the technical market.

IBM needs at least one large (over $100 million) OEM for two reasons: first, to help rebuild its tarnished reputation in the target scientific and engineering segment; second, to get IBM over the hump before its own SAA-minded sales personnel begin selling the RS/6000, in 12 months or so.

One important, indeed critical, price class is empty: the slimline desktop $5-$10K band. IBM will probably collapse the POWER chipset count and deliver an entrant to this space within a year. It is likely to be binary compatible with the rest of the RS/6000 line, but will sport relatively lower floating-point performance.

IBM has effectively been a nonplayer in workstations so long that it faces a double challenge. It cannot simply enter the market, it must also overcome a lackluster image and negative momentum. IBM's workstation share never exceeded 4% between 1986 and 1989 when both Digital and HP/Apollo gained share. It will take IBM from 12 to 18 months, at least, to gain enough momentum to seriously challenge the market leaders.

With Peter L. Burris - Director, IBM Advisory Service

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Euro-Systems from Bull. Bull last week bracketed the DPS-7000 family with new high-end (7000/500 and 700, said to be the most powerful system ever designed and manufactured in Europe) and entry-level (7000/A) systems. The new low-end systems, priced in the $80-350K range, are aimed at DPS-7 users and the GCOS-4 base. The new high-end systems ($1.4-14M) will be marketed as high-volume TP production servers with redundant capabilities. We assume the new systems will not break the pattern of earlier GCOS-7 systems in finding their primary habitat in Europe.

... And ICL. Meanwhile, ICL launched two new SPARC-based midrange systems, the DRS 6000 Level 40 and 50, which run V.4 at approximately 17- and 23 MIPS, respectively. ICL will sell the new systems in both the United States and Europe. In the European market ICL will target health, retail, and government verticals, while in the U.S. it will target legal and retail (largely thanks to its recent purchase of Data Checker) markets. The codeveloper, along with AT&T, of the SPARC Application Binary Interfaces, ICL expects that the ABIs will make it easier for developers to write software that will run unmodified on all SPARC systems running V.4. Unfortunately for ICL, Sun has yet to endorse the SPARC ABI, which is sure to have a negative effect on the availability of "shrink-wrapped" software.

Nynex Joins Motorola, IBM. For years the brick-sized data terminal IBM customer engineers have been toting around (which schedules service calls, identifies problems, and specifies which parts or procedures will likely fix them, all by means of the IBM radio network) have given IBM CEs a half step on the competition. Before the CE arrives at the customer's site, he's got a pretty good idea of what's gone wrong and how to fix it without having to call into the office. Now the manufacturer of the brick (Motorola) and the owner of the network (IBM) are teaming up with Nynex's Data Group to provide an interface to an extensive problem logging, assignment, tracking and close-out database. Between the three, there may not be too much room for competition for what's left of the airwaves.

Euphemism of the Week Award ....goes to the Human Resources PR staffer at Apple who came up with the "Transition Resource Center" label for the company's newly created outplacement counseling group. The center is chartered with aiding the 400 (3% of its workforce) employees affected by the February 21 layoffs. However, even a lunchtime seminar series titled "Surviving Corporate Change" will unlikely appease either laid off workers or survivors who catch wind of ex-Apple USA chief Loren's $4-5 million golden handshake (about four times his 1989 paycheck). The laid-off get full pay and benefits for two months, a severance package based on length of service and grade level, and unlimited use of the resource center.

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Layoffs, Lower Earnings, and Shake-Ups at Apple Computer

The Apple Computer legend — a cornerstone of entrepreneurial folklore — is a simple tale: visionary technical ability, engineering wizardry, and marketing genius solidified by an obsession with excellence.

In 1984, the simplicity of the vision (and the storytale) gave way to bottom-line reality. Steve Jobs gave way to John Sculley, and Apple gave in to the needs of businesses. While to some the changes signaled the end of the vaunted Apple culture, to others it heralded Apple's coming of age.

Either way, the strategy worked. After two years of relatively poor performance, Apple's sales and income climbed steadily. Apple seemed to have made the step from pariah to insider relatively bruise free, except for a few well-publicized egos.

But Apple's fortunes have again taken a turn for the worse. So far in 1990 Apple has cut projected revenue and earnings and quietly announced blue — and some very white — -collar layoffs. Unless Sculley and his new team can make quick changes, the bleak forecasts will extend beyond just this year. Consider the following:

- After years in double-digits, PC market growth is slowing to below 10%.

- Gaps in the low and high ends of Apple's product line are wide enough for a barreling Mack truck. Now that the dawning of the client-server age is dissolving into mid-morning, Apple's server strategy is nonexistent.

- As Apple's new products go, so goes Apple, and long-term demand for the portable, Apple's newest system, is lackluster.

Apple has earned a reputation as the ultimate product competitor. It invented the PC market with the Apple II, and defined consistent, easy-to-use graphical interfaces with the Mac. Yet the clear and present lack of new products upon which to base another phase of impressive growth looms as more than just a missing rung on Apple's ladder as it attempts to crack the Fortune 100.

In the age of openness and standards, Apple faces a more basic question: can a proprietary PC company compete solely on internal innovation? While marketing maven John Sculley is banking that it can, competitors, users, and potential investors are not.

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Flattening Market Growth

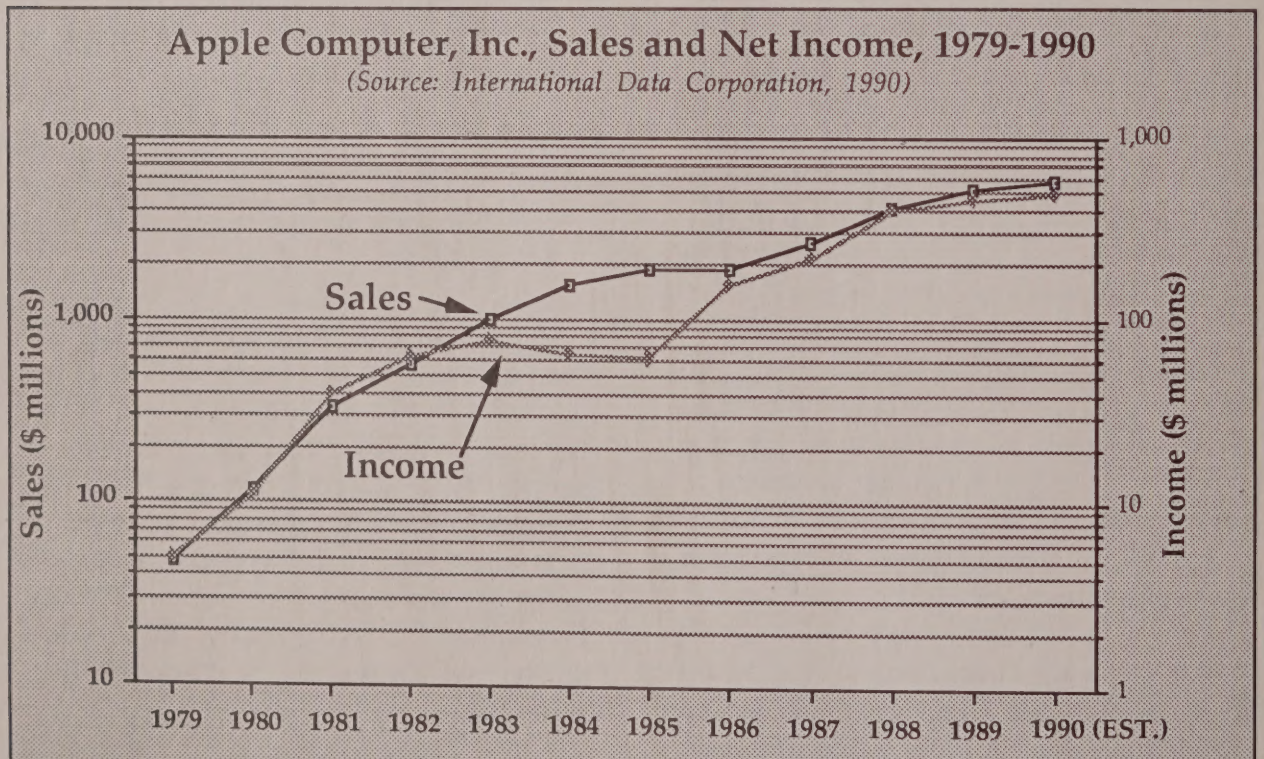
After three years of solid expansion, 1989 worldwide PC unit and revenue growth slowed. International (unit and shipment value) markets, which represented only 36% of Apple's FY'89 revenue, grew at double-digit rates, while U.S. markets were flat. Apple's decreasing sales growth is thus, in one way, merely symptomatic of all PC companies.

The youth of the PC business makes it particularly susceptible to changes in market conditions. Vendor infrastructures designed in bull markets do not weather bearish conditions as well as seasoned competitors in more mature markets.

Because fights for a larger piece of a slowly expanding pie get increasingly hostile, Apple's current troubles might be viewed as simply market driven. However, in addition to uninspiring demand for PCs, Apple has other problems.

Heightening GUI Competition

Other PC vendors continue to encroach upon Apple. The distinctive "point and click" technology that differentiated the Mac when it was introduced in 1984, and still serves as its



Apple experienced a period of decreased earnings (while revenues were still climbing) during the Macintosh ramp-up, beginning in 1983. Evidence suggests it may be entering another such period. While larger competitors are able to cover development cost more gracefully, Apple is feeling the pinch. **NOTE: Scale is logarithmic.**

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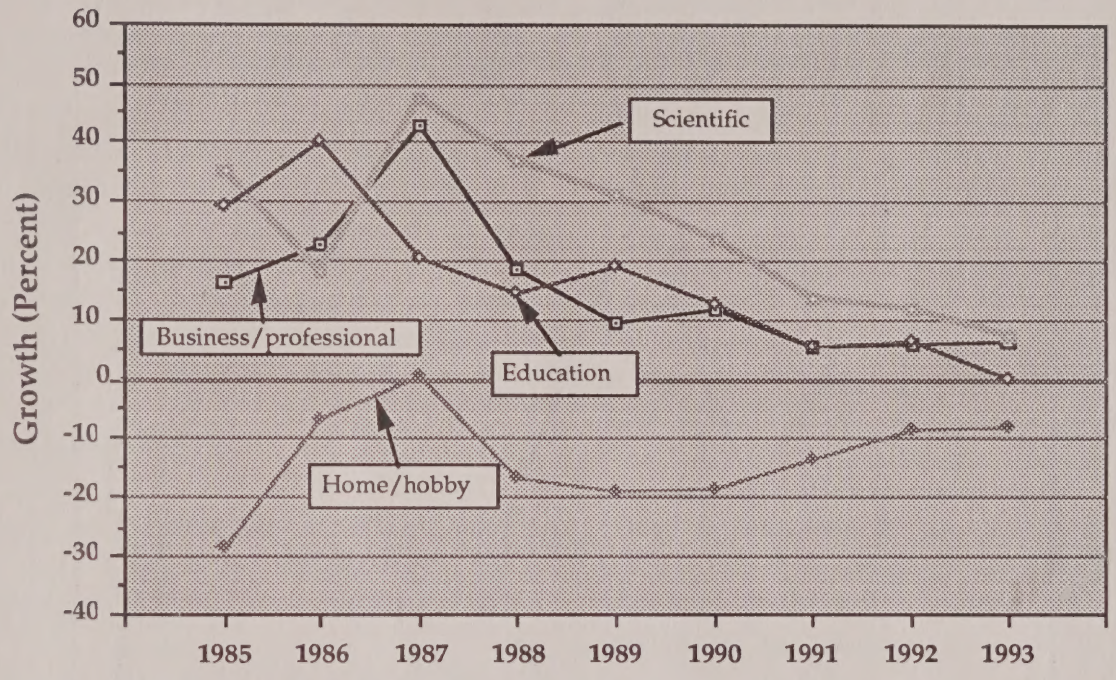
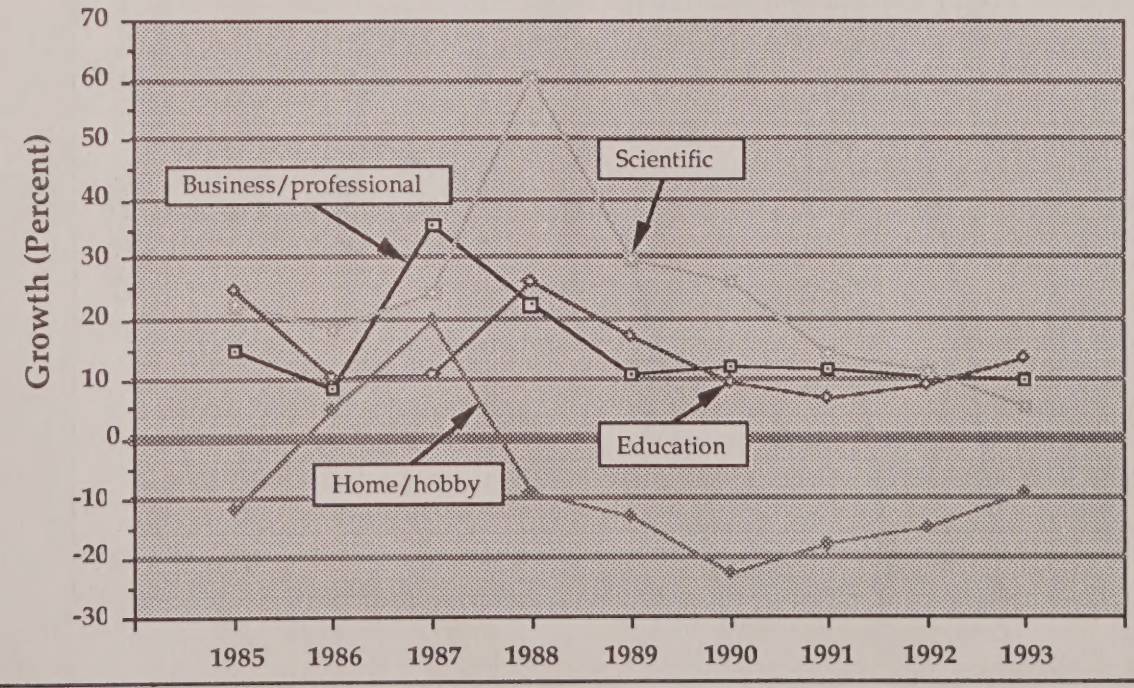
Worldwide PC Unit Shipment Growth by Market Segment, U.S.-Based Vendors, 1984-1993

(Source: International Data Corporation, 1990)



Worldwide PC Revenue Growth by Market Segment, U.S.-Based Vendors, 1984-1993



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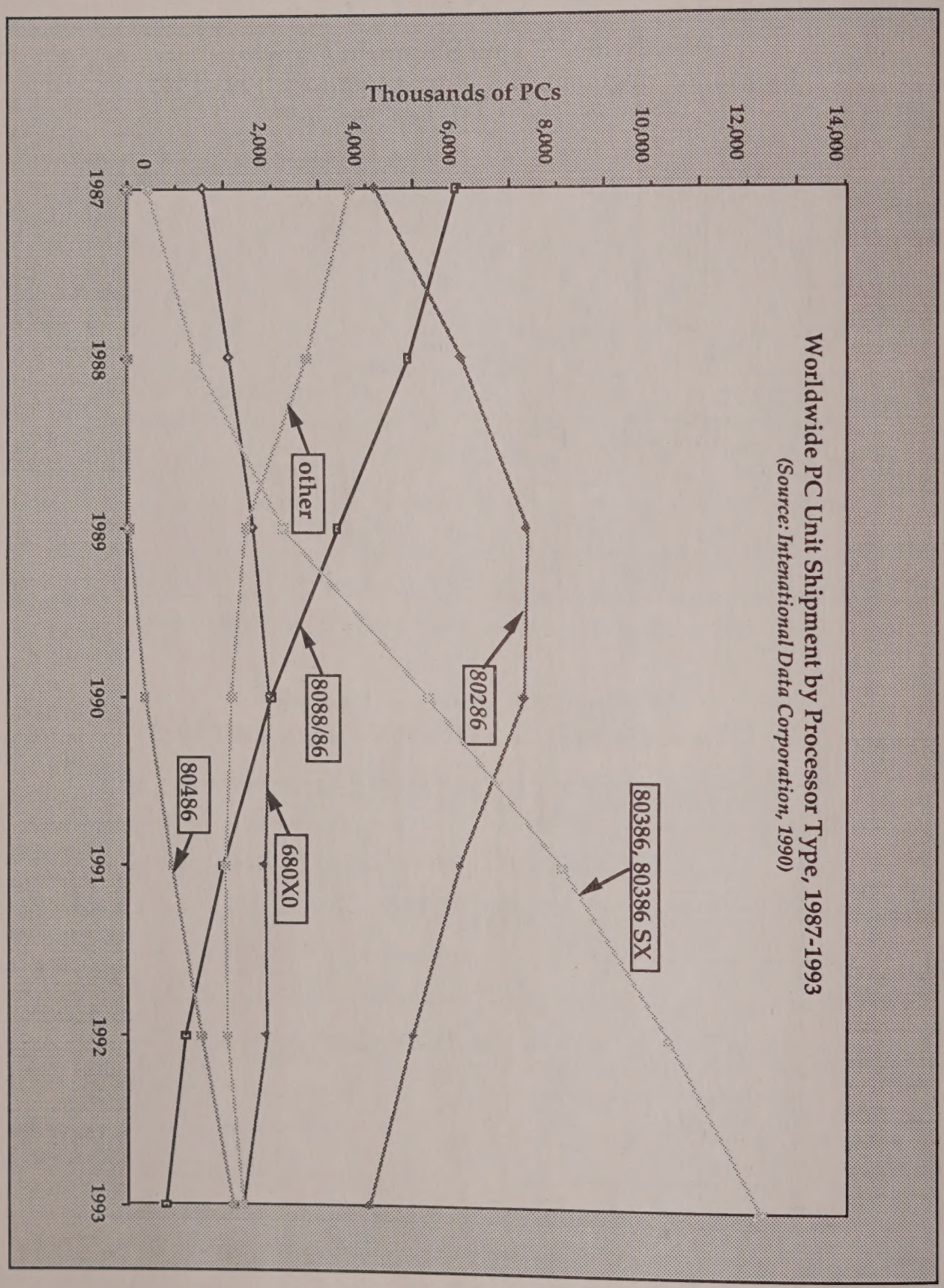

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main selling point, is no longer the only GUI and mouse game in town.

Intel '286-based PCs packaged with DOS and Windows (about 2.5 million installed) and '386s running OS/2 (200,000 installed) provide much the same interface. The OSF's Motif (running window management packages), Sun's Openlook and NeXT's Nextstep all approximate the Mac's ease of use. Users averse to deciphering cryptic command-line interfaces now can turn to MS-DOS, OS/2, Unix, or Macintosh for cozy point-and-click GUI.

Apple's Product Line

Apple has problems in three portions of its hardware product line: the low end, the middle, and the high end.

The low end and midrange of Apple's line is dominated by old (four or five years) technology. While the market wants color, all but the most expensive Macs are currently available only in black and white. While the market wants a lower-cost Mac for entry into the Apple line or for educational use, Apple appears to be unwilling to reduce prices below current levels even for a new system aimed at low-end buyers.

Meanwhile, delivery of an updated version of Apple's proprietary operating system, System 7, is still a long way off. Originally slated for mid-summer release, it now appears that an end-user version will not be widely available until as late as early winter. Apple software developers will receive their version this summer, but a general consumer-use version will follow by several months.

Apple has two high-end problems: it is staking a portion of its future success on high-end personal workstation systems (having had little previous success selling into the workstation market), and it lacks a product dedicated to managing communication between individual networked Macs.

The workstations will come. Mac IIcis and IIxis are currently positioned at the lower edge of workstation functionality. Although it will be 1992 before Apple ships a RISC-based product, modular upgrades to the Mac II line should bring them into more complete workstation ability. The expertise to sell into the scientific and sophisticated business-user environment may lag, but it too will come.

Service Immediately!

More important to Apple is the lack of a server product. While Localtalk networks were revolutionary in providing simple laser printer sharing and Mac-to-Mac mail connectivity, they have not been significantly improved in three years. As systems vendors rush to embrace the emerging world of client-server computing, Apple is, apparently, satisfied with providing just the desktop end of the equation.

However, the degree to which software developers will write to Apple's proprietary client specifications, to reach its installed base of 3.5 million Macs, is unknown. Unless the next version of Localtalk incorporates open or standard tokenring or ethernet in-

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terfaces, Apple will have to plan and build the client/server system itself.

Without a coherent client-server strategy, Apple will lose out to more efficient architectures. And Apple's promise, the "workgroup automation" theme that made the Mac wildly successful for five years, will ring hollow.

Fruit of Apple's Labor

Apple now plays in a wholly different world than that from which it came. In a standards-free world, highly innovative products can become overnight successes. A single technical visionary can propel a design team more easily than can collaborative partnerships with suppliers, other vendors, or users.

However, the emergence over the last three years of open hardware and software platforms, and over the last decade of de facto PC standards, facilitates successful ad hoc development partnering, and inhibits proprietary innovation.

Vendors of either de facto standards-based systems (which attract unsolicited hardware and software add-ons) or truly open systems are supported by external innovation. They can rely on users, resellers, partners, and independent developers to stretch product life cycles, stimulate the development of innovative new products, and provoke product designers to new heights more so than can the closed Apple community.

Our Vested Interest: *the Gray Sheet* and Apple's Server Strategy

Here at *the Gray Sheet* we're particularly concerned about Apple's lack of a server product. Call it selfish, but we're a little more than just worried about the difficulty of running a business on the Localtalk network. Our vested interest is a handful of Mac SEs sharing a Laserwriter II upon which all *Gray Sheet* graphic analysis, composition, and desktop publishing are performed.

You know what it's like: different brands and revision levels of word processing, graphics, and desktop publishing application packages competing for users. Articles and proofs charging around (as Microsoft Mail attached documents) from analyst to analyst to copy editor to printer, all in different states of completion.

What good would a server do? For one thing it would ensure that different analysts could use the same piece of application code for similar projects. And that would cut out a lot of unnecessary repetition and reformatting. With a central repository for shared *Gray Sheet* stuff, like templates, graphic objects, and protocols, the process of writing and assembling the bimonthly could be streamlined.

For another, it could provide a more efficient way of getting work done, by changing our work habits. (Wait a minute — that's what Apple used to say it was doing...Hmmm.) With a server and simple groupware package, we could improve quality and cut leadtimes.

Will an Apple server solve all our communication and collaboration problems? Doubtful. But it sure would help lubricate the wheels of collaborative analysis and communication. The most important question, then, is, Will we ever see it? And so far, Apple has given no indication of unveiling a departmental, workgroup, localtalk server.

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Developing an Evolutionary Innovation Style at Apple
(Source: International Data Corporation, 1990)

New Product	Innovation Type	Introduction Date
Low-end Mac	Evolutionary	1990 Q4
System 7	Evolutionary	1990 Q4
68040, 050 Mac	Evolutionary	1991
RISC Mac	Revolutionary	1992
Knowledge Navigator	Revolutionary	1992
Server	Evolutionary	Not currently planned

Used to be Apple could just go ahead and design "insanely great" products and the market would follow. Not anymore. While the allure of inventing revolutionary hypermedia-AI-brave-new-world products turns on product developers, it does little for the bottom line. Apple's big projects now involve more incremental innovation. And unless Apple isn't careful, it risks alienating its key researchers.

Apple's Challenge

Within its proprietary universe and product line Apple is changing course: it is adopting a new strategy based on incremental innovation and relying less on accelerating the product revolution. The question is, does Apple recognize the change?

Cultural, political, and competitive history indicates that Apple has always excelled at revolutionary innovation. But since Apple is now racing for such revolutionary product designs against competitors that have well-established collaborative relations with large and small developers (who, collectively, amount to a large and competent foe), that job is more difficult than ever before in Apple's history.

The alienation of Apple's last executive-level technical guru, Jean-Louis Gasse, indicates that Sculley is indeed changing the basis for innovating at Apple. Incremental improvements and product-line rehabilitation are less exciting than revolutionary new products, but will have a more immediate and lasting effect on the bottom line.

Maintaining morale amid the cost-cutting layoffs and R&D course changes will be no small feat. For one thing, Apple will need a new technical visionary, but one who has both feet firmly on the ground. Surely Sculley, in spite of his devotion to the "knowledge navigator" concept, does not think he can provide both technical vision and efficient operational expertise of a $5 billion company.

With no earth-shattering, flashy new products with which to wow potential PC buyers, Apple's evolution revolution has begun. Incremental improvements will become the norm, rather than just a necessity, for the greatest product company of them all. And while life in the Valley may seem more mundane for the Apple R&D squads, it's the best way for the company to compete in today's PC (read also client/server, workstation, distributed processing ...) environment.

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Compaq SystemPro Developments. According to Rod Canion, Compaq CEO, over 6,000 of its dealers' technicians have signed up for training on the SystemPro. Canion indicates a new release of the system will pass 100 MIPS in the "not too distant future." and he sees no reason why the current dealer channel cannot sell a $250,000 version of the SystemPro. Canion feels that dealers are generally doing a good job of supporting networked Compaq customers, and that declining price/performance will continue driving applications downwards, despite the potential for support problems.

NetFRAME Ships. Fifteen NetFRAME systems went out the door in December, and by the end of February CEO Enzo Torresi expects that hundreds will be installed, all in the United States. Larger systems are outselling smaller ones by a five-to-one margin with average selling prices in the $70K to 75K range, about twice what NetFRAME expected. Unlike Compaq (which works with 600 resellers and 3,300 dealers), NetFRAME seems dead set against overdistributing its servers. Nationwide NetFRAME plans to sign on up to 150 VARs, which may choose from opening direct relations with NetFRAME or going through Businessland. International expansion begins this month. Torresi believes that NetFRAME will be sold as super file servers through 1990 and by 1991 will be used more as database and compute servers.

Sunny Outlook. Much of Sun Microsystem's product development focus will be on portable "personal machines," (ie., dynabook) and not necessarily desktop systems, according to R&D VP Bill Joy. With ISDN providing "carry and connect" communication, Sun sees fewer reasons to tie users to the desktop.

New Low-End IBMs. On February 6 IBM announced new AS/400 and 9370 models. The AS/400 C10, C20, and C25 replace and extend the existing AS/400 line — the primary generator of new midrange business for IBM. Performance increases (of up to 120% over the B10) are due in part to increased minimum and maximum memory(8MB standard, twice that of the B models). The 9371-10, -12, and -14 bring S/370 architecture down into the IDC small-scale system arena for the first time in over 15 years. Behind the downsizing is the convergence of PC and multiuser technology in the Micor Channel architecture, which is employed on all three models. IBM says the new 9370s derive from a year and a half of discussions with key large accounts about distributed S/370 requirements. But a last gasp effort to find a market for the 9370 is less interesting than the implications for future low-end computing. One advantage is the use of the same 295MB, 3.5" DASD as in the new AS/400s. The other is the opening of a new world of lower-cost I/O devices through the MCA bus.

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The Outsourcing Debate: Effective Management with Multiple MIS Suppliers, or Letting the Fox Guard the Henhouse?

In 1962 when John Akers was but a sophomore at IBM, Henry Ross Perot left Big Blue and along with a handful of ex-military officers begat the systems integration (SI) business. IBM, apparently, had balked at Perot's suggestion to sell systems expertise and programming skills, packaged on top of leased, rented or borrowed iron and code, to give users performance without the technical headaches.

Nearly 30 years later IBM is trying to avoid missing another potentially important computer service market opportunity. It has joined the "outsourcing" parade by forming its System Services organization (on January 10) to oversee the delivery of technology management services. One of the unit's first moves was to hire Perot's new company to confer a degree of understanding of the facilities management business upon Big Blue. IBM and SI have come full circle.

Outsourcing embodies an evolutionary twist on SI strategy. The best publicized example is Kodak's arrangement with IBM, Digital and Businessland. IBM will manage the data center and SNA network, Digital will handle all other data and telecommunication network management, and Businessland will support and install PCs and LANs.

Kodak hopes to improve information systems (IS) quality, reduce IS spending, and focus on the business of making and selling photographic equipment and supplies. But relying on outsourcing to increase MIS productivity, or cut costs necessitates asking important strategic questions:

- Increasingly information technology (IT) is used as a competitive weapon: users seek technologies which will give them design, cost, distribution, or marketing advantages over their competitors. To maximize the time value of competitive information, strategic resources must be able to respond quickly. However, outsourced information management functions may be necessarily less responsive than in-house systems due to their distance from strategic planning.

- In typical customer-supplier relationships, customers dissatisfied with a product can replace the supplier. However, the organizational and operational experience that accrues to an outsourcing vendor is difficult to replace; indeed outsourcing flies in the face of industry trends towards openness and easily-replaceable vendors. Replacing an outsourcing vendor means facing steep experience curves during

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which the user organization may be placed at a huge competitive disadvantage. While the switching costs associated with hardware and software systems are high, between hardware, software, operations, development and maintenance they are exorbitant.

- Determining the appropriateness of outsourcing calls for a make or buy analysis which includes quantifying "responsiveness." While outsourcing vendors pledge responsiveness, the hidden lag time required to communicate strategy or tactical changes to outsiders could be a potential trap for outsourcers.

Outsourcing goes against the trend of IS organizations to build links to end users and lines of business. However, if an organization admits its centralized, data center approach is obsolete, outsourcing is a good way to wind down the data center investment.

Is outsourcing a logical extension to the thinking that popularized tightly managed supplier relationships, promulgated in the Far East, which have been successful in reducing design-to-production lag times, eliminating waste and improving quality? Or is it a passing fad endorsed by service-hungry vendors seeking to offset slipping margins and revenues on their income statements?

Just as systems integration never was for everyone, outsourcing is not now for everyone. Gauging its cost effectiveness and business sensibility is two parts strategic analysis and, only then, one part financial.

Outsourcing Benefits

With examples of cost savings from subcontracting manufacturing functions, from using outside publishing resources, and from acquiring components from external suppliers, for example, the idea of seeking an external source for information processing seems logical.

But MIS cost containment is probably not the main reason for the recent rash of outsourcing contracts. Outsourcing is simply one of several alternatives which MIS or top management can invoke to improve the performance of the MIS organization. Five types of benefits have accrued to organizations using outsourcing solutions:

- Near-term risk reduction: Using outside expertise to reduce the risk associated with undertaking mission-critical IS projects is outsourcing's most compelling benefit. When organizations absolutely, positively need IS resources, they go outside. Why? Because you can't sue your own MIS organization.

- Rescue from technocratic morass: The view that MIS technocracies are inflexible and unresponsive holds true in some organizations. Outsourcing may be used to regain control of MIS in two ways. First, management can replace portions of MIS

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staff and tasks (the bailiwick of the entrenched technocracy) with outside resources. The technocracy's influence decreases with its decreased responsibilities.

Second, management can gain an objective measure of the technocracy's efficiency, or lack thereof, by inviting outsourcing bids for MIS functions, and then using the bids as cost/benefit mileposts for evaluating MIS's performance.

- Access to expertise: A limiting factor in any organization is technical expertise: according to IDC research, MIS organizations are losing the most technically proficient personnel to consulting and services vendors. Outsourcing is one way to reach technical expertise when the local labor pool may be dry.

- Converting capital to cash: Selling off assets to improve a cash position is an old strategy. Viewing information technology and management as a sellable asset, however, may not be. Cash can be generated from outsourcing, both in the form of up-front investment in hardware and software, as well as ongoing staff and expense reduction.

- Rapid response to ownership change: Divorce from, or acquisition by, a new corporate parent may require wholesale changes in information technology deployment. Rather than invest in a completely new IT system, or hiring personnel to manage the conversion to the new system, outsourcing may enable the organization, to hit the ground running.

Who Should Outsource?

The critical question for potential outsourcers is one of control. Successful outsourcing may be a function of leveraging external information systems management vendors against internal MIS shops without sacrificing control over the end product.

However, achieving that balance is not as simple as stating its allure. Any organization choosing outsourcing necessarily relinquishes some control over its strategic destiny to the outsourcing vendor.

Traditional SI customers — relatively static organizations like local, state and federal governments and insurance claims processors — have relatively stable missions and strategies. The short- and long-term cost reductions achieved through outsourcing may well outweigh the impact on strategy.

Organizations in less stable, but not volatile, environments can also benefit from outsourcing. However, for those whose strategy is tied to competitive use of information technology, or which operate in industries or niches subject to regular competitive jockeying for position, outsourcing is a double-edged sword.

While outsourcing might appear to have the power to lop off administrative bloat, it may also place these organizations at a severe disadvantage when they must rapidly coordinate coherent strategic responses to changing competitive situations.

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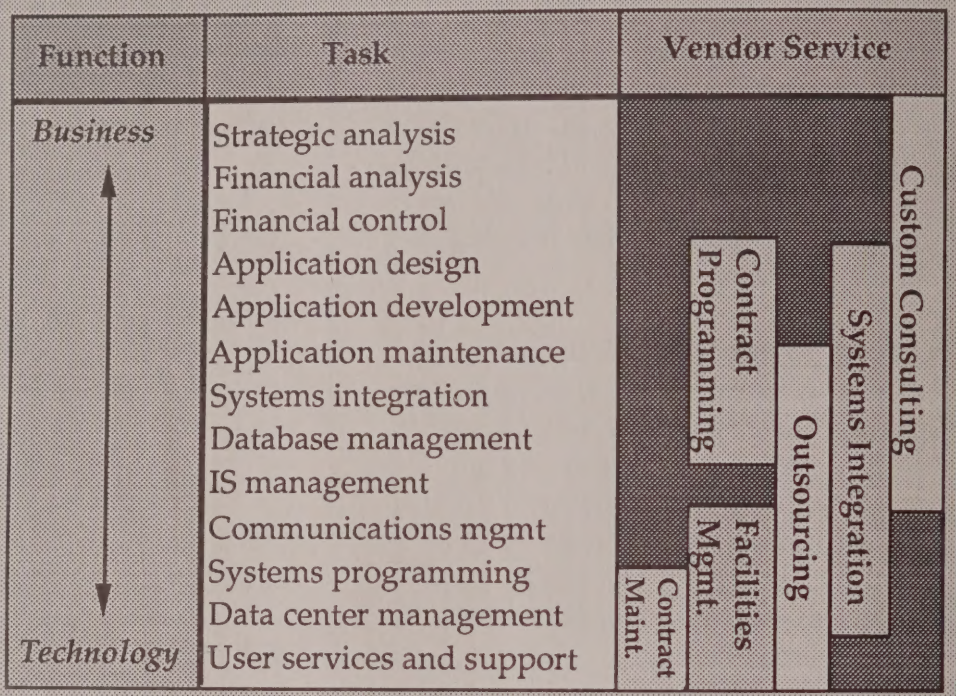
Computer Industry Services: Drawing the Business Strategy/Information Technology Distinction

(Source: International Data Corporation, 1990)

Whether defining outsourcing, facilities management or SI, delineating where one service leaves off and another picks up creates arbitrary boundaries. Current outsourcing wisdom makes a distinction between business strategy and the management of technology: outsourcing vendors manage all technology functions, while user organizations retain control of business functions.



However, technology functions are having a greater impact on strategic decision making. Business strategy functions encompass more of the tasks on the business-technology continuum in this illustration.

At the time of the birth of what has come to be called systems integration, users had a greater need for vendors' expertise. Business strategy involved producing, distributing and selling. Data processing was a cost of doing business and usually only concerned payroll and accounting functions.

Over the last three decades users have, by and large, gained equal technical footing with vendors. MIS is a lubricant to the organization, easing the production, distribution and sales processes. Forward-thinking users are constantly creating new uses and applications for IT that further streamline their businesses. Intimate knowledge of an organization's technological and information assets enable the organization to create more responsive systems and processes with which to do business.

As a result, drawing a strategy/technology distinction is becoming more difficult as the two become intertwined. As IT is increasingly a vehicle-driving strategy, and less a simple means of delivering the fruits of the strategy, uncoupling strategy from technology has negative implications.

Organizations examining outsourcing solutions must take a careful look at tasks which fall into the gray area: application design, development and maintenance, systems and network integrtation, database management, and IS management. Retaining control over each of these functions, and not just the data itself, is the most critical outsourcing challenge.

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More insidiously, it may widen the gulf between planners and technologists. If strategic planners are unaware of the upper limits of an organization's strategic and competitive use of technology, any strategy they devise may be technologically shortsighted.

Outsourcing Advice

Outsourcing is one of many choices available to MIS organizations with which to contain costs and maximize return on IT budget. Here are some suggestions for performing a meaningful analysis of how outsourcing may help an organization:

- Determine where the organization makes the business/technology split. View outsourcing the organization's business functions with skepticism. Farming out the future may look attractive in the short term, but may be a long-term disaster.

- Use examples of successfully managed supplier relations as models for analyzing outsourcing relationships. Determine which control systems work well between the organization and suppliers, and emulate them in forging relations with outsourcing vendors.

- Invite outsourcing bids to gain an understanding of which areas could be streamlined, regardless of whether the streamlining is done by internal or external staff.

Data Through the 1-2-3 Lens: Lotus's Multiplatform Strategy

Back in 1983 when Lotus was a $50 million rising star, product line diversification didn't seem important. Then, after three years of stunning growth, being called a one-product company became something of an embarrassment, and diversification became a consuming passion. The result was a prolonged slide from triple-digit early-eighties revenue growth rates.

Now, once again, Lotus is boastful of its one-product strategy. Only this time, by porting 1-2-3 to IBM, DEC and Sun platforms, Lotus is doing an about-face with a new stab at diversifying, and not calling it diversification.

Perceived demand for a common-interface, cross-organization spreadsheet/database product does not alone, however, a success make. Even with the familiar look and feel of 1-2-3 (known to 10 million users with access to the 5 million copies of 1-2-3 sold worldwide in the '80s), Lotus is entering a new market and faces several hurdles:

Marketing Issues:

- Touting and delivering on truly enterprise wide 1-2-3 are two different pursuits. Absent in the Lotus announcement was any mention of IBM's S/3X or AS/400 platforms which account for over 30% of the

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worldwide unit shipments in small- and medium-scale systems markets. Shortly after the Sun ballyhoo, Lotus announced that 1-2-3 for the Macintosh has been delayed until at least 1991, while 1-2-3 for Windows has never been announced.

•Lotus believes 1-2-3 will coexist with other software vendors' products and that users will purchase it as an adjunct to existing applications packages. However, a potential mainframe-class price tag may bring direct competition from entrenched, more experienced sales, distribution and support teams.

•Image problems from oft-delayed Lotus products will continue to hurt Lotus's efforts to become a major player in markets dominated by competitors like Oracle and Computer Associates. If users continue to perceive that Lotus cannot deliver on its promises (the Macintosh product was announced in 1987) Lotus loses credibility and sales, and even the best marketing will have been for naught.

Strategic Issues:

•Lotus inked 1-2-3 pacts with IBM for the 370 in 1987, and with Digital for the VAX in 1988, indicating that these commitments might have drained developmental resources, and prevented Lotus from focusing on 1-2-3 for faster-growing workstation markets (even with a financial push from Sun) simply to save face in the development community.

•Lotus indicates that software support will represent the third of a three-leg revenue structure which includes software sales and information publishing. However, entering the software support business takes more than words. Lotus expects that staffing and operating the support infrastructure will cost approximately $30 million annually.

•The 1-2-3 Release 3 slippage let Excel and Quattro sneak into the spreadsheet market. Lotus has to keep an eye on its own backyard or risk further share erosion of its bread-and- butter product.

Whether the expansion is the result of hardware vendors seeking 1-2-3 on their systems placing pressure on Lotus's brass, or a concerted effort by Lotus to prepare its users for making the jump to distributed and cooperative processing systems, is an intriguing question with long-term implications. However, if the strategy sells, who cares how it was developed?

A more urgent question concerns the strategy's short-term success. Is the new multiplatform diversification another ill-fated effort for the spreadsheet king, or can Lotus successfully wade into the deeper organization-wide software battles?

Why Multiplatform Motivates Lotus

Users analyzing the potential value of Lotus's multiplatform products would face a simpler task if Lotus offered a clearer vision of when which versions of 1-2-3 will be available. It has started logically enough with the Sun version, but the leaked and yet unannounced intention to jump to

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VAX and then S/370 platforms is a large and perplexing one.

While the demand for Unix 1-2-3 is apparent, demand for a graphically-limited large-scale system 1-2-3 is not. Both Access Technologies and Computer Associates currently offer enterprise wide spreadsheet products, neither of which is successful enough to warrant the enormous development expense associated with the VAX and S/370 platforms.

True, when the "common 1-2-3 on all systems" strategy is viewed as a gradual evolution, and not a culmination, the allure for users is greater. Introducing VAX and S/370 1-2-3 may be an intermediary (albeit expensive intermediary) step meant to introduce Lotus users to the benefits of retaining the 1-2-3 interface, while concurrently recognizing the benefits of enterprise-wide data sharing.

With that understanding, Lotus may be gambling, users will flock to the next phase — installation of Lotus-designed 1-2-3 database and spreadsheet servers scattered throughout an organization's network.

And Challenges Lotus, Too

Technical and marketing accomplishments aside, the challenge for Manzi, King and company lies in transforming Lotus into a bona fide mainframe software company.

Lotus has apparently overcome one bugaboo by announcing the Sun leg of the multiplatform strategy in working order, on time. It must overcome organizational inertia to successfully complete its diversification strategy and move Lotus beyond shrink-wrapped PC software. Lotus faces two types of challenges:

- Hiring and retaining software support engineers who can solve MIS (as opposed to Joe End User's) technical problems. A quantum leap.

- Develop channel and support management expertise to sell and support end users through a confusing combination of direct, reseller, and OEM sales agreements.

Conclusion

The bottom line is that Lotus has delivered a solid product for the Sun platform. It will sell well, but not phenomenally well. As a single product, it's fine.

As the introduction to an expensive, and questionable, multiplatform strategy, however, it leaves potential users with several questions. They will wonder how serious Lotus is about the multiplatform market, given its pock-marked strategic direction and historical tardiness getting new products to work.

Users will also wonder how serious Lotus can be, given its limited R&D budget, and the enormity of the tasks of developing and supporting mainframe software. Finally, they will wonder how serious Lotus should be, given the recalcitrance with which users have traditionally greeted other mainframe and multiplatform spreadsheet products.

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Siemens Acquires 51% of Nixdorf. A financially floundering minicomputer vendor named for its founder, with voting stock tightly controlled by the family, has been gobbled up ... and it wasn't Wang. While Nixdorf stays in business, Siemens' gains vault it to the top of the European market. With the acquisition, Siemens: ties with IBM for top spot in Germany, gains software expertise(software developers accounted for 14% of Nixdorf's 1988 staffing), becomes a major player in all three parts of the multiuser market, expands its position in targeted vertical markets like retail and banking, and consolidates its telecommunications leadership with Nixdorf's ISDN-capable 8818 systems.

Shields No Longer Not Ready For Prime Time. The announcement that ex-Digital VP Jack Shields now heads Prime may be an endorsement of the CAD vendor's emphasis on service and support. Having played a major role in the creation of Digital's U.S. Field Service Group, it's doubtful any applicants had more demonstrable success in building and delivering support strategy. As the rift between value-added/proprietary and price-performance/open mid-range strategies widens, Prime's hopes lie, apparently, in the support.

Loren Gassed, Apple to Pare Down. Flattening sales and declining income precipitated the announcement of layoffs of 600 to 1,000 Apple employees, 100 of them in the Chicago distribution center alone, and the replacement of Allan Loren by Michael Spindler at the top spot of Apple USA. What are his chances? With only two of Apple's products selling in any volume, no major announcements expected soon, and another year before an end-user version of System 7 hits the stands, the challenges facing Spindler are as much development as they are marketing (his expertise). Unless Apple developers can come up with a hot selling low-end product, or unless Spindler can impute an understanding of how to sell high-end products to the downtrodden U.S. sales force (we understand "workstation" is still a dirty word in the halls of Cupertino), these layoffs may be just the beginning. By the time they're done Apple may be down to but a few core people.

AT&T's Bloody Monday. On January 15 at 2:30pm AT&T's long-distance network took nine hours off to observe the birth of another famous communicator, Dr. Martin Luther King. While AT&T's Robert Allen is loudly offering restitution, many users are wondering if it could happen again. According to IDC's ISDN and Intelligent Networks analysts, it sure could. With different versions of SS6 and SS7 on the same AT&T (and MCI) networks (Sprint uses only SS7), testing for version compatibility will keep AT&T busy for months, with no promise of complete debugging.

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Computer Industry
REPORT

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1989 — Change, Potential, and Promise: A *Gray Sheet* Retrospective

Change, potential and promise, three words that dominate *the Gray Sheet's* retrospective on 1989.

Change occured in political and economic systems, and in the computer industry. Institutions and technologies fell, replaced by more responsive substitutes.

The changes hold potential to increase the efficiency and efficacy of managing and distributing resources like information, people, and money.

At the heart of the changes and the potential they hold is recognition of the promise of the power, beauty, and fundamental necessity of individual freedom and creativity. If anything, the "self-critique" of Mikhail Gorbachev's perestroika turns the locus of control from ossified bureaucracies back to individuals. The changes recognize that individual people and their ideas, not rigid planning or mandated production quotas, are the ultimate sources of new wealth in any economy.

In the computer industry, no less of a major turnaround is occuring. The generic term is downsizing. But it's more than simply replacing big iron with small iron. It's a quantum leap in the way in which we think about computing.

For years pundits have forecasted the coming of a "second generation" of computing. The demise of massive centralized data processors would be wrought, some felt, by powerful customized interactive workstations networked together to unleash individuals' creative power.

At the heart of second generation thinking is the observation that individual creativity is the wellspring of increased productivity. Give power to individuals, and they will get the job done better than a static bureaucratic organization ever could.

The *Gray Sheet's* Top Ten Stories of 1989

1. Europe 1989, 1992 ... and Beyond
2. AD/Cycle and IBM's Software Investments
3. More Minicomputer Blues
4. The Two-Front Operating System War
5. New Products Bring Turmoil In the High-End
6. Networking Trends
7. U.S. Supercomputer Vendors Sputter
8. Integrated Office Systems Futures
9. Disk Drive Shakeups, Shakeouts
10. The Two Faces of Multimedia

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Looking at the 1989 *Gray Sheet* list of top stories, one is struck by the degree to which second generation computing concepts dominate. Seven of the ten stories can be directly traced to constructs of the second generation: software standards, networking, desktop computing.

Has the Second Generation arrived? Probably not. Can you hear the footsteps? You bet. In the computer industry, 1989 will be remembered as the year the second generation of computing continued nibbling away at the entrenched institutions and strategies of the old guard.

Changing Europe

The evolution of the 1992 Common European Market (CM) alone merits consideration as the leading business story of 1989. The concept of creating a single market of over 300 million consumers, through the reduction of national trade barriers, seemed to hit home in 1989 (despite the fact that 1992 was not "made" in 1989) and has sent U.S. vendors scurrying.

Optimistic U.S. vendors are rubbing their hands, developing strategies for venturing forth into the new market. Pessimists fear the growth of a new class of international competitor — a truly European company — aided by pan-European regulatory agencies that might bar them from competing in Europe. Either way, the 1992 CM changes will affect information technology companies of all sizes.

Since October, however, the changes sweeping across the darkness of eastern Europe have both expanded the spotlight on the European Economic Community (EEC) and shifted the EEC's policy focus.

Whereas attention had for months been focused on member-nonmember reciprocity, rules of origin, and antidumping policies, now it has been expanded to reconcile the sudden possibility that fitful Polish, East German, Czech and other eastern-European economies need to be included in 1992 planning.

Technology vs. Bureaucracy

However, in the East, the information technology Catch-22 (***the Gray Sheet***, 24:5, August 27, 1988) remains: without information technology, liberalizing a Soviet-style system is almost impossible. And yet the hardened bureaucracy of that system makes the introduction of information technology difficult, since it involves overcoming the massive institutional inertia accrued to the top of Soviet-style state and industrial enterprises.

For U.S. IT vendors the wait-and-see attitude is lifting. Data General's recently formed partnership with a Soviet software firm and an Austrian industrial engineering firm to market Eclipses in the Soviet Union is one example. The installation of pro-Western democracies, possible easing of the U.S. Department of Commerce's COCOM

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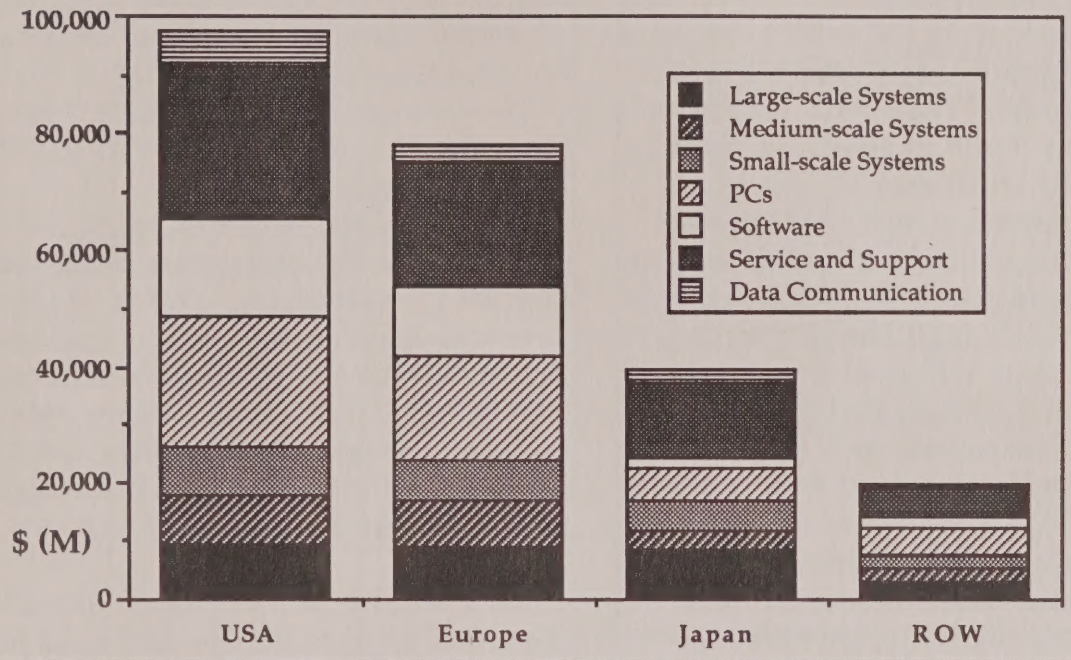
How Important is Western Europe?

Worldwide Information Industry Basic Elements By Region, 1988 ($ Million, All Suppliers)

(Source: International Data Corporation, 1990)



trade restrictions, and an improved investment climate will undoubtedly spawn more partnerships in eastern Europe.

Yet the grim reality of archaic eastern European transportation, education, and communication infrastructures stands as a huge barrier to successful IT deployment. Until the basic building blocks of a demand-sensitive, response-oriented economy capable of servicing a market as complex as the IT industry are put in place, the monolithic central-planning systems of the past will continue to hinder the adoption of computer products.

Meanwhile, members of the EEC continue to push ahead. Europe 1992 represents both threats and opportunities to international IT vendors. The promulgation of pan-European standards, combined with decreased intra-European travel and trade restrictions involves more than the simple creation of new markets. It also raises questions of bi- and multilateral trade agreements, trade sanctions, nationalist sentiments, and the political implications of opening trade to foreign competitors.

Protectionist Threats

Although popular consensus of European industry is strongly opposed to protectionism — fortress Europe — it may happen anyway.

- Individual CM members are empowered to impose any limit on third country imports that they deem necessary to "protect" national health, safety, or the environment, without actually specifying what constitutes health or safety. The abo-

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lition of internal frontier controls may be accompanied by a "leveling up" of external barriers across the EEC to that of the highest barrier of any single member.

- In the negotiations of the General Agreement on Trade and Tariff's (GATT's) on trade in goods, the idea of "overall reciprocity" prevails: there is agreement to lower import barriers across the board rather than industry by industry. If a leveling up to unacceptably high barriers occurs, fortress Europe will exist for all U.S. vendors, except those that have established themselves as "made-in-Europe" players.

- Specifying a country in which goods undergo their last substantial transformation is the basis for determining its origin, according to the EEC. While it is generally adhering to a 60% yardstick for measuring local origination for manufactured goods, the Commission has recently indicated that integrated circuits must be "diffused" in Europe to be considered European (as part of its campaign against "screwdriver plants"). Any European-assembled product is considered as having its origin outside the Community when more than half its value represents goods and services produced or performed outside the Community, and is then subject to 14% tariffs.

While the elimination of frontier controls between common market members is one of the primary objectives of 1992, it may not be attainable without increasing barriers against non-EEC countries, including the U.S., Japan, and others.

On the other hand, reduced barriers to accessing a single market of over 300 million people have already accelerated some vendors' plans and expectations for international growth.

Two Challenges for IT

The efforts to include a common European market on the global commerce map creates two challenges for IT planners and strategists: leaping into the western European market by evolving into truly international companies, and then recognizing the special role IT can play in stirring the dormant economies of eastern Europe.

Even without a leveling-up of trade sanctions, fortress Europe will exist for conservative companies. Without a manufacturing, assembly, or marketing foothold in Europe, in the form of outright investment, partnerships, or agreements, some non-EEC-based vendors will be shut out.

So far, U.S. vendors are responding differently. Larger vendors have been operating European manufacturing facilities for years. They stand to reap benefits from the opening of closed markets by virtue of this presence.

The most successful newcomers will be those which are now plotting strategies for becoming "European": building manufacturing plants, as opposed to assembly plants, forming joint marketing partnerships for cross-continental coverage, and focusing on product specialization and niche markets within the EEC.

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We have seen how the simplest manifestation of IT, the fax machine, has become an important conduit for communicating information. In a similar way, IT can become the lubricant with which to get the immobile economies of eastern Europe past the moment of inertia and at least on the road to the 21st century.

At the core of playing the Common Market game is planning, and it's private, demand-driven planning, not centralized quota-driven mandates. While the benefits may not be immediately apparent, international competitors are already drawing their strategy teams together to begin plotting their way into a single European market.

IBM Software

IBM's largest product-related moves in 1989 were software announcements. Two of them, AD/Cycle, and, collectively, the purchase of ownership stakes in no less than 13 independent software vendors (ISVs), indicate IBM's intention to promote SAA as the most credible suite of computing standards for the '90s.

SAA's initial announcement almost three years ago provided a grand vision centered on application portability across strategic IBM environments. However, missing interfaces, protocols, and conventions for managing software lifecycles in SAA presented huge barriers to anyone interested in pursuing IBM's application strategy.

With AD/Cycle, IBM switched the focus of SAA from application portability across hardware environments to application integration. AD/Cycle introduced a mechanism for enforcing consistent software engineering practices across the life cycle and across a platform delivering common services supporting the SAA Common Programming Interface.

The AD/Cycle announcement takes an interesting twist when viewed in light of IBM's expanding investment and acquisition strategy.

In ***the Gray Sheet's*** initial analysis, AD/Cycle's actual openness was questioned: "IBM may well introduce its own version of tools that functionally overlap tools from independents. When this happens — and it probably will — IBM may be tempted to steer the direction of AD/Cycle to improve the market position of its own proprietary tools."

Although SAA appears more open as a result of the announcement, sources inside IBM remain steadfast in stating that AIX is still Big Blue's "open" platform. So while IBM's investment strategy is strengthening ties to the outside world, room remains to question SAA's true openness.

However, with the investments IBM is tacitly admitting it doesn't have all the answers. The investments will serve to promote communication between IBM and the ISVs (both ways), thereby theoretically improving SAA products, and it forces ISVs to make a decision: to develop for either DEC, IBM, or Unix.

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Finally, IBM's software moves shift users' focus off the issue of control and the perils of proprietary architectures, and onto the actual delivery of SAA products. With the perception of openness less of an issue, users, ISVs, and IBM can all concentrate on making SAA work.

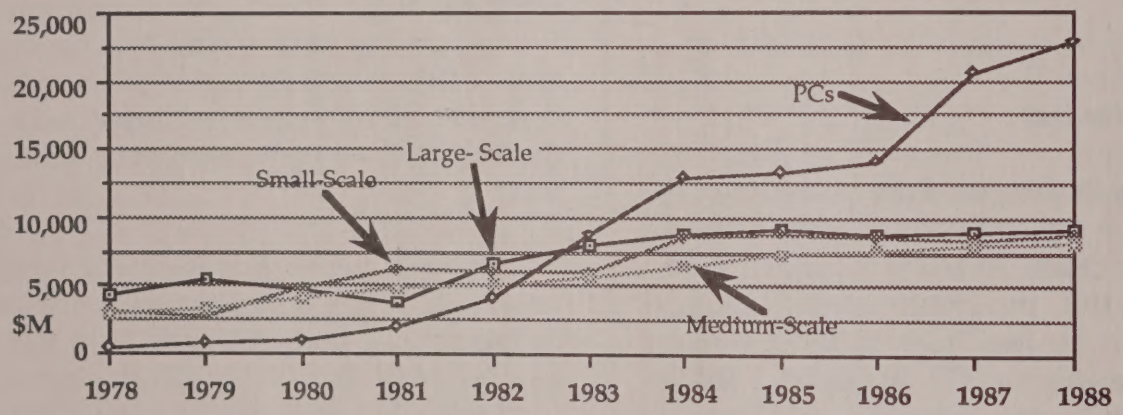
Mini Blues

The developers behind the technology driving the downsizing evolution apparently feel no compunction about flailing away at industry institutions when they're down. When Compaq, NetFrame and others debuted "superservers" late in 1989, there was no mistaking their intended effect: further displacement of minicomputer vendors.

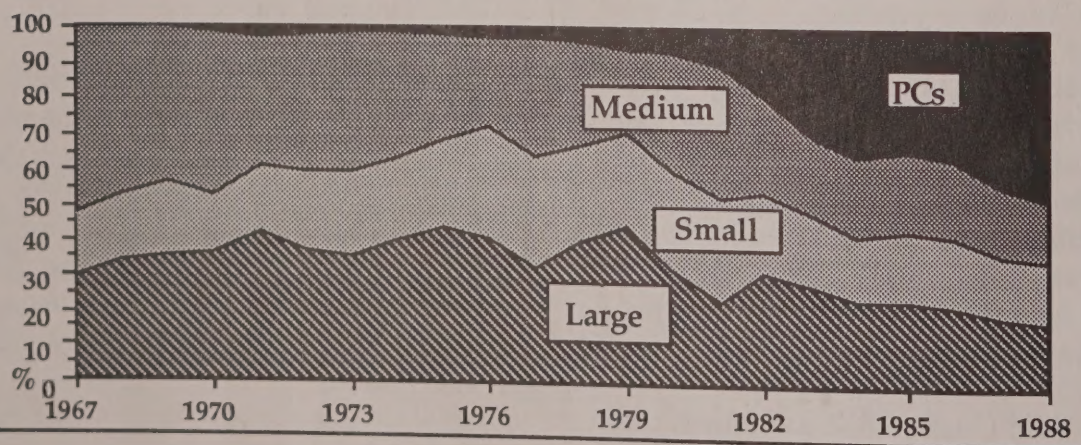
The encroachment of PC vendors into the minicomputer domain worsened mini-vendors' 1989 woes. Layoffs (Data General, Digital, Prime, Wang), management shakeups (Data General, Digital, Prime, Wang) and corporate reorgs (Data General, Prime, Wang) became the norm. About the

U.S. Medium- and Small-Scale Systems Revenue Flattens, While PC Revenues Continue To Climb (1967 - 1988)

(Source: International Data Corporation, 1990)



... And the Medium and Small-Scale Systems Vendors Lose 40% of the Total U.S. Market to PC Vendors



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only upside to report is that rush hour on Route 128 is considerably less hectic these days.

The reasons for the slow-growth/no growth conundrum are based in technological substitutes. Minicomputer vendors felt the pinch of the downsizing squeeze play from above and below.

The success of IBM's AS/400 cut into other mini vendors' sales. In the slow-growth medium-scale systems market, growing market share is a zero sum game: rewards come at others' expense. When that other is IBM, the sales come a little tougher.

Primarily, however, the specter of increasingly functional networked PCs and workstations bit into minicomputer sales.

The popularity of the client/server concept in the minds of potential customers (whether or not it's actually workable) stalled departmental minicomputer purchase plans. The very real market success of LAN vendors (3COM, Banyan, Novell) impeded sales growth of small and medium-scale systems to single digits.

Competition in the middle was intense in 1989, leading to discounting, lower margins, lower returns, and a host of organizational problems. While the recent past is bleak, it is also prologue — unfortunately for the mini vendors — and only the organizations that are able to respond quickly to the rapidly changed market conditions will thrive, or even survive.

As a result, practically every small- and medium-scale system vendor retrenched and realigned around a new strategy in 1989. Two extensions to mini vendors' strategies (*the Gray Sheet*, 24:11-12, December 9, 1988) have been further divided by small- and medium-scale vendors frantically searching for a way out of the mini morass.

Yet nothing short of institutional and organizational overhaul is likely to ensure that the companies will continue to prosper. Both strategies, building added value onto proprietary platforms and continued price/performance breakthroughs in industry standard computing, require the vendor to adopt new organization and operational incentive-based work flows.

While the minicomputer market is maturing, it is not mature. Mini vendors that attempt to compete with anything less than a completely flexible organization that can instantly re-shape themselves around, and into, the changing industry, are prone to failure.

OS Uncertainty

With 16-bit versions of OS/2 dead in the water thanks to its own technical inadequacies and the surprisingly strong sales of DOS, and with the Open Software Foundation (OSF) — Unix International (UI) battles and reconciliations dragging on, operating systems' struggle for supremacy of the desktop remained a top story in 1989.

DOS/Windows vs. OS/2

The bottom line in the DOS-OS/2 battles is migration. Corporate users neither want, nor can afford to migrate

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data and applications twice a year.

The demise of the never-very-lively 16-bit versions of OS/2, DOS's primary low-end competition, can be attributed to two problems: Microsoft's inability to complete the "compatibility box" (for running DOS applications on OS/2 platforms, and high user satisfaction with DOS.

DOS, packaged with Microsoft's Windows, has been perceived as almost functionally equivalent to OS/2, and the lack of perceived benefits of switching from DOS to 16-bit OS/2 has effectively killed OS/2.

With IBM pegging OfficeVision's client components on the OS/2 platform (see "IOS IOUs," this issue), pressure to upgrade may eventually become serious enough to compel corporate customers to ante up.

Still, switching costs are probably enough to keep non-OfficeVision prospects on DOS at least through 1992. As a result, 16-bit OS/2 will continue to struggle to gain a significant part of the low-end operating system market.

Much of the success of IBM's and Microsoft's platform for the future now rests on the third or fourth quarter 1990 shipment of 32-bit OS/2 for the 80386. If 32-bit offers a real difference in processing ability over DOS/Windows, IBM's and Microsoft's long-term OS/2-based strategies may not be derailed.

With only approximately 3% of the PC general business software designed to run under Windows, and under half of PC general business software firms designing future products for Windows, long-term prospects favor OS/2.

However, having failed in its ludicrous attempt to migrate several million 8- and 16-bit processor-based systems to '386 systems overnight, IBM and Microsoft are trying to push a huge installed base of yesteryear's PCs into tomorrow's operating environment. Even as PC — including '386 — prices cascade, DOS will continue to capture the largest share of sales, and the long-term shift to OS/2, while not quite a Pyrrhic victory for IBM, will be nonetheless very expensive.

OSF vs. (or is it "And") UI

For eighteen months, the two de facto Unix standards bodies (see ***the Gray Sheet***, 24:2, 25:7) went about their business.

Trying to reconcile the competing interests of different product teams within member organizations, each played a cat and mouse game, strategically leaking product direction information in attempts to gain industry-wide support. The "Unix wars" were fought over technology futures.

Announcements late in 1989 moved the battleground out of the lab, and to the frontline. They also fueled rumors that the groups intended to merge (with AT&T's USO melding into the OSF), leaving the question: and what of the Unix wars?

Multiprocessing militarists need not yet worry that the Unix wars will go the way of the Cold War. The emergence of UI's commercial here-and-now V.4 and OSF's two years hence

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"microkernels for the masses" strategies still reveal two very different views of the Unix world.

The merger rumors were born out of the reasoning that Unix wars over kernel standards are of interest only to a few hard core Unixers. More contentious issues — user interfaces, networking — are largely settled, witness the tacit industry-wide agreement on Motif.

When UI and the OSF realized that fighting over kernel strategy made less sense than admitting that jumping from robust, commercial V.4 to a more adventurous OSF/1 or /2 probably required a two-kernel thrust, the possibility of a merger heightened.

While significant organizational, financial, and strategic barriers to an OSF-UI merger remain, they are being whittled away as each group carves out a niche in Unix markets of today and tomorrow.

Turmoil in the High End

For the last two years, *the Gray Sheet's* review and forecast has identified the static nature of the large-scale system market. In 1989 that changed. There were two high-end new-product announcements in the 1980s. Both occurred within days of each other during October.

Why the sudden commotion? Both new large-scale competitors, Digital and Tandem, felt at least two types of squeezes that compelled them to bring high-end systems to market:

- Competitive pressure from established small- and medium-scale vendors cutting into their revenue and margin from below and the sides.

- Lack-of-horsepower complaints from customers pushing existing VAX and VLX installations to the limit of their processing power on the high-end.

Digital and Tandem hope to win two types of sales: a market share steal from existing mainframers, and growth in existing installations. The latter is considerably more likely than the former, and, unfortunately for the newcomers, is also a considerably smaller portion of the overall mainframe pie. As a result, both systems will only marginally impact the slow-growing large-scale systems market.

Market share is the name of the game in the large-scale system market. Cracking IBM's installed base, almost 65% of the market, is a software and data migration battle.

Yet neither newcomer offers an attractive enough combination of price/performance differential over installed IBM high-ends and migration tools to convince Blue-minded data center managers to make the expensive, risky, and troublesome plunge to a new high-end architecture.

However, both systems will be successfully sold as replacements or stepwise upgrades for customers who have already reached the upper limits of VLX or VAX processing power.

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While Digital and Tandem can expect to grow these installations with the new high-end products, their share of the large-scale market will be essentially inconsequential to IBM, since IBM would not normally consider large DEC or Tandem upgrade sites as potential new customers.

Meanwhile, in response to slow large-scale system growth, plug-compatible manufacturers got a little leaner and meaner in 1989. Amdahl laid off 400 employees (5% of its workforce) in November, and NAS, purchased by Hitachi (60%) and EDS (40%) in April to form Hitachi Data Systems, gained some financial stability.

Networking

Networks have an increasing influence on computing. In 1989, three issues dominated: the growth of LAN/WAN integration, the appearance of paying ISDN customers, and the identification of network service as a primary differentiating factor between equipment and services vendors.

Local to Wide Area Networking

If several of the last four years have been called "the year of the LAN" by various sources, then 1989 qualifies as the year internetwork equipment markets gained legitimacy.

Approximately 25% of today's 40 million PCs installed worldwide capable of connecting to a LAN are connected. By 1993 over 50% of approximately 60 million PCs will be connected. Growing internetwork equipment functionality and installations are an important step in the evolution of decentralized information systems.

With the need for inter-LAN communication increasing, so are bridge, router and gateway installations. Few other parts of the worldwide IT market, in fact, will be growing at the 40-50% annual rates projected through 1993 for internetwork equipment markets.

ISDN

Meanwhile, people wonder if ISDN has stalled. Many DP and telecom managers still coexist in separate and competitive domains. No overwhelming new hybrid communication service has come to life to "revolutionize" the way we work and seamlessly meld the two different oprganizations, as early ISDN pundits promised.

But, according to IDC's ISDN practice," ISDN is around us like a rainbow: when you're in it you just can't see it."

By mid-year, long distance carriers and three RBOCs were selling ISDN. All major PBX and system vendors were feverishly developing PBX to computer ISDN links. While ISDN is not ubiquitous, it is well beyond the trial phase.

Network Services

Telecom and DP managers are too familiar with the problems that occur when communication and system vendors start pointing fingers: network downtime, lost productivity and (increasingly) loss of competitive advantage. With single vendor networks as outdated as the rotary dial, finger-pointing during downtimes between vendors is on the rise.

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The growth of the importance of network service is at least partially due to the fragmentation of the Bell System. Before 1984, when a user experienced network problems, he or she called the phone company. In a multivendor world, it's every vendor for itself and, as a result, some users get left out.

Vendors with a demonstrated commitment to network integration, service and support have the upper hand in gaining new hardware and software sales. Users are requiring specific types of service and support arrangements, and they selectively disqualify vendors who fall short of certain support criteria from future hardware sales.

For hardware vendors, as hardware margins fall and revenue flattens, ancillary products will continue to be important. Companies will increasingly turn to systems and network integration-like activities, often unaware of the difficulty of providing — and profiting from — those services.

Shivering Supercomputer Market

1989 will be remembered as a shakeout year in the U.S. supercomputer industry.

Spiralling R&D costs, long the bugaboo, took their toll. Technological replacements (mini-supercomputers and massively parallel supercomputers), and vertically integrated foreign competitors encroached upon high-end large-scale system vendors.

Thanks to "non-protectionist" protectionist measures, no U.S. supercomputer sales were actually lost to foreign competitors, although prospects were bleak enough to force CDC's ETA and Evans & Sutherland out of business, and promote the sundering of Cray Research and the unleashing of Seymour to Cray Computer.

U.S. dominance of the worldwide supercomputer market, once a seemingly sure thing, is now threatened by upstart minsupers, the massively parallel and well-heeled Japanese competitors.

The huge costs of designing, and then the lengthy process of building and testing supercomputers, is hindering U.S. efforts to remain a primary player. While, foreigners seek and receive financing in debt markets, U.S. vendors seek financing in more expensive, and riskier equity markets.

As a result, non-U.S.-based vendors' claims to the supercomputer future are legitimized almost exclusively due to R&D costs and the availability of capital. While supercomputer technology concepts are still "born in the U.S.A.," they are becoming too expensive for most U.S. companies, except perhaps AT&T and IBM, to nurture.

The high-end distress is yielding mini-supercomputer creativity. Clusters of $1 to $3 million Convex's are successfully replacing roughly $20 million new Crays. Massively parallel systems from Thinking Machines, Intel and Masspar further threaten Cray's high-end domain.

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Cray's greatest asset remains its installed base of software applications. The problems with transforming batch-oriented uniprocessor code into code for up to 64,000 parallel processors shoud not be underestimated. In addition, ensuring the reliability of uniprocessor hardware is far simpler than testing and guaranteeing the reliability of massively parallel systems.

Yet users almost always customize software for a $20 million dollar supercomputer system. For some users the (admittedly, unknown) cost of redesigning or coding applications, may be a good enough reason to gamble on a massively parallel system. Five to ten times performance improvements promised by Cray in its next generation systems may not convince buyers to forego either the huge price advantage of mini-supers, or the quantum performance leaps of the massively parallel systems.

Meanwhile, Seymour Cray has given his new company until 1991. Unless the gallium-arsenide, 16 processor Cray-3 system is shipping, Cray Computer is kaput. That's one way of getting a handle on supercomputer R&D overruns, but it's probably not the best way to keep the U.S. supercomputer industry in business.

IOS IOUs

First it was DG with CEO and IBM with OfficeVision (June), then DEC with Phase II of All-in-1 (October) and finally HP with NewWave Office (November). The integrated office systems (IOS) announcements represent major strategic efforts to renovate products that, in some cases, date back to the early 1980s. And vendors are hoping their splashy announcements will turn into big hits in IOS markets of the 1990s.

The pre-shipment posturing poses a basic question: are the big three commercial system vendors cutting a leadership position out of the client/server evolution/revolution, or are their IOS announcements defensive positions aimed at keeping users in line by jumping into the swelling LAN-based IOS tide?

The reasons for the flurry of announcements are the changing hardware platforms on which IOS software runs. Reconciling client/server architectures in an aging, host-based timesharing world, and maximizing the benefits of PCs' in office environments, involves more than just upgrades.

The most notable portion of IBM's IOS announcement was the lack of DOS/Windows support. While supporting the general constructs of the client/server model, IBM designed the client end to the lowest common denominator, 8088-based PCs running DOS only. The less-than-optimal job on the character-based interface is intended to accelerate customers toward a OS/2 upgrade.

Phase II of Digital's All-in-1 strategy centered around an effort to reach into the non-Digital world, supporting diverse client platforms, and third-party application development. A notable absence, however, is support for

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graphic interfaces beyond DECwindows.

Whereas IBM protected host and host application investments with OfficeVision, HP focused on protecting investment at the desktop by incorporating graphics-capable 286 PCs and DOS users in NewWave Office. In doing so, HP took the lead in IOS innovation and usability.

At the heart of each announcement, beyond gushing embracements of "openness" and "standards," is the desire to maintain and grow an installed base. No easy task, since LAN-based PC applications are encroaching upon traditional IOS systems, generally comprised of centralized small- and medium-scale systems and non-programmable terminals.

As a result, the client/server distributed processing model is at the core of each strategy for a good reason: each vendor must at least appear to embrace new PC and networking standards. While publicly touting the "openness" of their products, IOS vendors acknowledge that (even proprietary) functionality is still a more important selling criteria, while openness remains an RFP checklist item.

No comprehensive Unix IOS offering looms on the horizon. Therein lies a problem of "open systems." "Comprehensive" when referring to IOS offerings is almost synonymous with proprietary.

In truth, the IOS offerings are both defensive and offensive. Inspired by PC and LAN threats against the installed base, they are protective. Promising a path out of the minicomputer mess, they represent the hope of, and need for, the three major commercial hardware vendors to act more like software companies.

Low-End Disk Drive Turmoil

Commodity high-tech markets mean Far-Eastern domination, right? Not according to some U.S. disk drive vendors.

The maturation of two U.S. storage vendors (Seagate and Conner Peripherals), in light of another year of industry wide negative cash flow, is one of the year's top stories. Combined with the laughable, and maybe criminal, antics of Miniscribe's book-cookers, the commodity storage market (and comedy of errors) becomes one of the year's most heartening and then embarrassing stories.

To buck the trend toward offshore ownership of storage manufacturing, Seagate and Conner adopt different strategies. Seagate, with approximately 35% of the $7 billion OEM disk drive market, takes the bigger-is-better position. It relies on highly vertically integrated, near-capacity production to produce low-cost drives.

When Seagate purchased Imprimis in September, the question arose: with the move to huge, vertically integrated storage vendors, can the small, technology-oriented, non-vertically integrated producers survive?

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Conner is going to give it a shot, using Japanese-inspired management technques. It is a company built around the concept of responsiveness, not a bad idea in an industry where products fly and die almost overnight.

Conner manages a series of upstream suppliers (at least two, preferably three for every component) with military-like precision. As a result, it is quick to ramp up and down, minimizing inventory write-downs and margin hits.

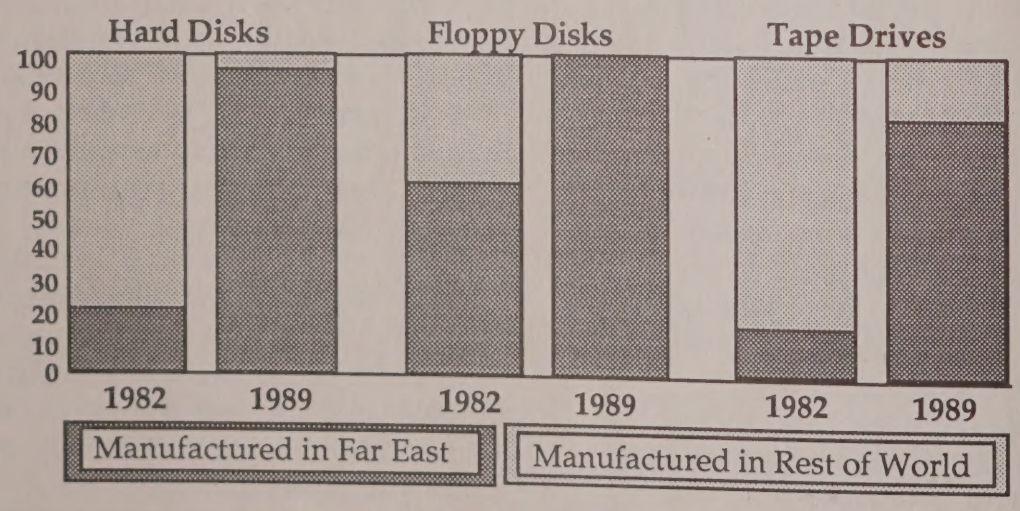
The 1990s challenge for disk drive vendors is efficient retooling during ever-shortening storage product life cycles. When more capital is consumed by tooling a production facility than is generated by selling it's output, managers become frantic. Some apply hard work, common sense, and meticulous business methods, and they get results like those at Seagate and Conner. Other managers panic.

Take a look at Miniscribe. If 1989 was the best of times for the aggressively managed Conner and Seagate, it was the worst of times for Miniscribe. Miniscribe managers provided the definitive description of a desperate company: shipping boxfuls of defective product to remote warehouses. Shipping cartons full of bricks to phantom customers. Double- and triple-shipping orders "by mistake."

And then, by breaking into the accountant's office to fix everything with some creative forgery, the sublimely sleazy became ridiculous. When Miniscribe went Chapter 11 on the first day of 1990, b-school casewriters were probably rubbing their hands with glee. Regardless of merit, you can only write so much about just-in-time inventory controls, matrix management and flexible manufacturing.

Growing Far Eastern Dominance of Storage Device Manufacturing vs. ROW, Percent of All Devices Manufactured by Location, 1982 and 1989

(Source: InternationalData Corporation, 1990)



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Multimedia: Two Views

What'll the desktop of the future look like? If you guessed some sort of windowing, talking, networking, image, and video arrangement, you're probably right, at least according to Apple, Intel, Microsoft and others who are promoting the fuzzy concepts of hypermedia, multimedia, and desktop audio and video.

At first the mumbo-jumbo sounds like a lot of hype — another case of technology searching for an application. PC hardware and software vendors are constantly searching for new "beachhead applications" to drive sales. The multimedia sirens resemble the videotext hype of years past. They're interesting, but perhaps not immediately relevant.

However, the excitement surrounding multimedia is more than hype. Real applications in training and education are providing the initial impetus to get multimedia moving. Illusory (for now, anyway) applications like low-cost video production and editing systems may evolve as the second tier driving the multimedia market.

In the long run, however, multimedia has a greater role in the IT industry. It is expected to define the desktop user interface of the future, much as the Macintosh graphical interface popularized the use of windows and a mouse and opened personal computing to users allergic to command lines.

To proponents, multimedia will allow computer neophytes to easily portray electronic information in useful new ways. It will provide standard audio, graphic, and video input and output interfaces for complex data queries and reports, and provide a range of choices for inter- and intra-organization communication through networked PCs.

Intel's digital video interactive (DVI) de facto standard, currently three boards of circuitry, should be reduced to a single board by mid-1990. When that is further reduced to a single chipset mounted to industry-standard motherboards and sold as a standard component of PCs, multimedia and digital video will overcome its primary obstacle, which is zero installed base.

Overcoming the switching costs associated with writing applications and converting data to a multimedia baseline will be the next hurdle. Given the current fury over (the control of) future operating systems standards, the placement of standardized multimedia platforms should be enough to pull the development of multimedia applications.

When viewed as a standardized platform for future interfaces and applications, and not just the latest whiz-bang technology, the 1989 multimedia posturing becomes more important than just technology hype.

The combination of real-world, money-making applications available today, and the potential for greater long-term growth have sustained the development of more than one futuristic technology.

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IBM Ups Storage Density. By increasing magnetic storage density on platters to one gigabyte per square inch — 15 times tighter than current standards — IBM is once again flexing its R&D muscles. Storage devices using the new technology (heads flying two millionths of an inch over the magnetic disk surface, as opposed to six millionths in conventional drives, and reading data recorded into tracks 100 times narrower than the 3480 Mag Tape Subsystem) won't be available before 1992.

HP Buys into Fault Tolerant Market. With but $5.8 million, HP has scored a minor fault tolerant coup by investing in and signing joint marketing and development agreements with Sequoia. HP gets exclusive rights to market fault tolerant systems to U.S. telcos, as well as Sequoia's fault tolerant and multiprocessing technology. Sequoia gets some financial stability and a RISC architecture with which to compete against Tandem and Stratus. Although Sequoia loses access to a market that had accounted for almost 20% of its installed base, it can still strike relations with other vendors and resellers for the European and Asian PTTs.

Lotus Notes, Platforms. Lotus says it is renewing a commitment to its core products: spreadsheets and business graphics. However, selling groupware or medium- and large-scale applications software is a far cry from selling shrinkwrapped software. The two recent announcements expand the selling job Lotus faces by more than the simple addition of products. To wit Lotus has been busily hiring a dozen new direct sales/marketing reps.

That's DEcorum, Not DECorum. The "day-core-um" alliance between IBM, HP (Apollo), Locus, and Transarc has begun yielding results — in addition to bothering DEC fans with a clever play on letters, that is. The cross-licensed set of distributed Unix protocols, building on each vendor's specific expertise (HP/Apollo's NCS, Transarc's file sharing) have been submitted in response to an OSF request for technology. The DEcorumites have recognized the benefits of working through the OSF, following on the success it demonstrated selling Motif as "open technology," whether or not OSF actually ever gets an operating system out the door. However, the four emphasize they are in for the long haul. Initially favorable reports on the degree of integration of the various elements of distributed computing through existng products indicate that the OSF might do well to adopt them.

DEC NAS Ads Hit the Stands. A year to the day after the DECtop I announcement, DEC kicked off a NAS advertising campaign in national business dailies (Digital? Advertising?). One question sticks in our mind: Why did DEC wait so long to tout its software glue for multivendor interoperability? This is one post-Shields change which is better late than never.

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U.S. Memories Looking for Love in the D-RAM Market

When dynamic random access memory shortages during 1987 and '88 forced U.S. PC and workstation vendors to curtail production and shipments, Congress and the national business and trade presses sent up a cry for a viable, competitive U.S. DRAM production industry to end domestic dependence on foreign sources of memory components. Perhaps tired of relying on federal trade regulations and mandated component pricing floors — which arguably added to the severity of the memory market's past problems — seven semiconductor and systems vendors, led by IBM, responded by investing in the formation of U.S. Memories (USM) in March of this year.

When and if funded, the proposed corporation's purpose is to lead a U.S. chip-producer charge back to the top of the DRAM hill. Its members hope that supporting a U.S.-based DRAM producer will lead to lower prices and more uniform availability of memory components. Moreover, USM's sponsors, noting that the size of the DRAM market is expected to reach $15 billion by 1993, are peddling the investment potential of their consortium to IT companies still on the sidelines.

On paper, the idea is attractive. IBM has provided core technology and seasoned management expertise to jumpstart USM. For $5 million, investors get a 1% stake in USM and commit to buying a portion of its 4-megabit (Mb) output — seemingly small prices to pay for conceivably more consistent component supplies at less variable prices, and a piece of the huge DRAM market.

Nevertheless, chances for USM's success have taken a dive. Potential sponsors are questioning both the need for, and investment viability of, USM. And, of course, there is always much speculation about the Blue Giant's motives, regardless of how benign they may seem. Consider the following:

Supply Concerns

- Wild PC and workstation demand in 1988 exacerbated difficulties chip vendors were experiencing bringing large-scale 1Mb production capacity on line. USM was conceived at a time when worldwide DRAM demand spiked to 120%.

- Slowing downstream demand for systems is relaxing the upstream DRAM crunch. IDC and In-Stat expect that more temperate system growth rates will lead to DRAM shipment value growth of between 5% and 20% per year through 1993.

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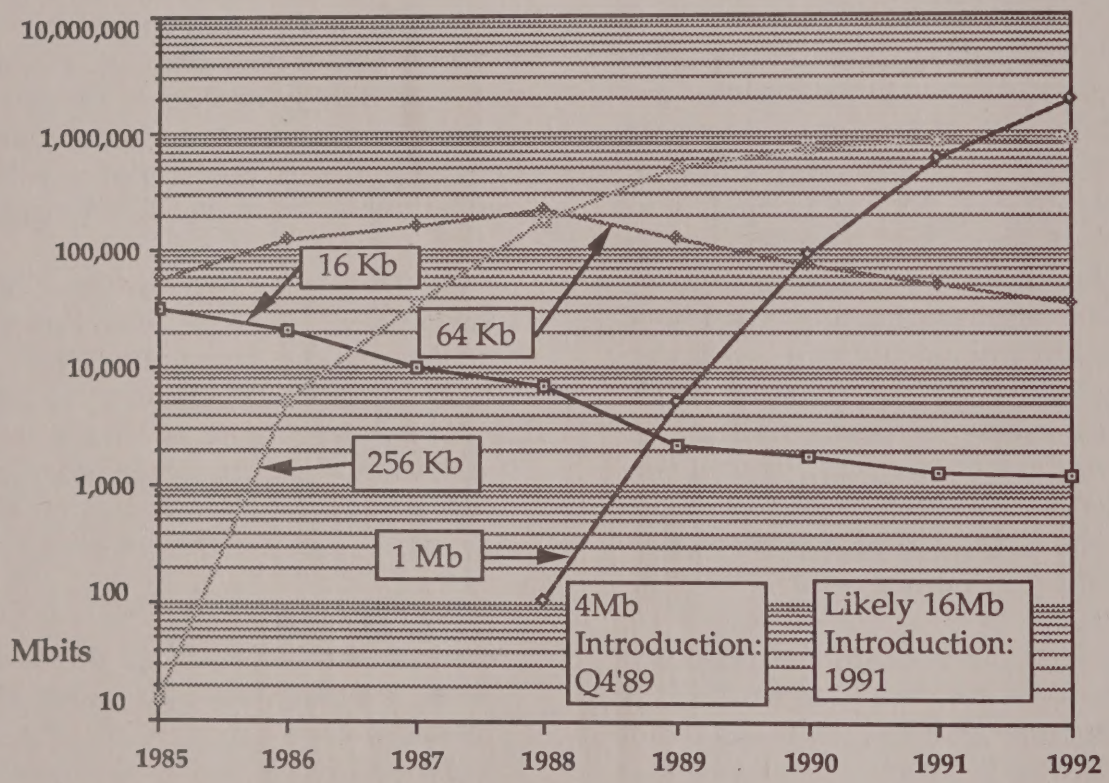
•In the midst of trade tensions, many systems vendors are loathe to take actions that could undermine existing, and long cultivated, lines of memory supply.

Investment Concerns

•Current 1Mb DRAM market leaders may be exercising a degree of control over DRAM availability. By alledgedly operating at approximately 50% of production capacity, and perhaps maintaining artificially high DRAM prices, they have invoked the wrath of potential USM backers. USM's existence could prod price controllers to play differently. However, established DRAM producers could use excess capacity to crush any USM onslaught. In a defensive move to pro-

Shipments of Total DRAM Megabits by Chip Size, 1985-1992

(Source: In-Stat, International Data Corporation, 1989)



This chart shows total Mb shipments of four sizes of DRAM chips between 1985 and 1992. USM intends to enter the 4Mb market in 1991, although other manufacturers are readying Mb production facilities now. Extrapolating the 1Mb curve, and approximating the introduction date and production curves for 4Mb chips reveals the difficulty of USM's goal: by the time its 4Mb chips are in quantity production, other vendors further along the experience curve will have a technical and cost advantage developing the next generation of DRAM chips. While USM will not be shut out of the 4Mb market, only swift action will reduce the experience advantages of other vendors. The longer it takes USM to achieve financing and commence chip fab plant construction, the tougher the long-term battle.

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tect market share, Pacific Rim producers (notably Hitachi and Toshiba) could bring more capacity on line, and drive prices through the floor.

- USM will endeavor to take on the 4Mb market, largely on the coattails of IBM's trailblazing technology. By 1992, however, when — if — USM's $100 million chip fab plant is operational, the 4Mb market will be awash with highly efficient competitors. To remain competitive, USM must display not only product leadership, but process leadership as well — something the U.S. semiconductor industry is less well known for.

IBM Motivations

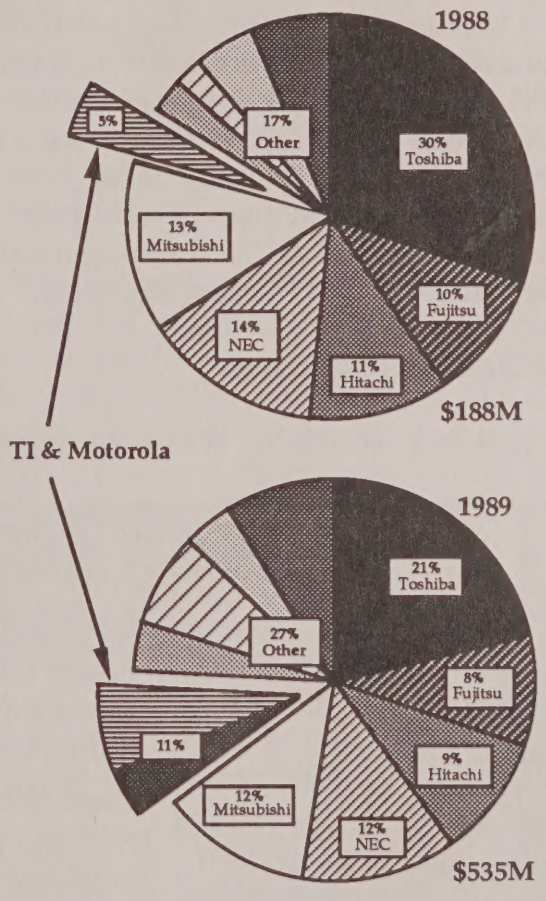
- Moreover, by 1992 the market's attention will begin to turn to incorporating 16Mb, even 64Mb, technology into products. Assuming that USM is capable of blazing new avenues of technology transfer, IBM and other sponsors must continue to be willing to pump innovative products and processes into USM's pipelines. Big Blue, after all, has regularly stated that it considers its vaunted capability for producing semiconductors to be a major source of advantage in the systems business.

The DRAM jam (see the *Gray Sheet*, 24:4) is over. U.S.-based systems vendors have turned their attentions away from problems based in securing upstream supplies to problems associated with a slowing IT industry. Amid fluctuating conditions in the systems market, USM is in a battle to raise enough capital to get off the ground. Its fate may now be in the hands of a few noncommittals, like AT&T.

IBM's New Cards

At least initially, the new memory collective is an IBM-supplied startup. Big Blue has given USM flesh in the form of technology, mind in the form of management, and status to even be considered worthy of investment by virtue of Armonk's strong backing.

1 Mb Revenue Market Share
(Source: In-Stat, International Data Corp.)



As competition heightened in the 1 Mbit DRAM market in 1988 and 1989, the top five Japanese vendors saw their collective market share decline. Even when Motorola's and TI's Japanese-produced shares are included, the big five lost 16 market share points.

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After years of maintaining that corporate decisions were made in the best interest of world trade, and that the company would realize no clear-cut benefit by entering the DRAM market, Armonk is whistling a different tune.

IBM is apparently willing, for the first time, to don the American flag and distribute its memory technology because it strongly believes that, looking forward, its main competition is not headquartered between these shores. This may or may not be justifiable, but it does imply that IBM will be willing to take whatever actions and perform whatever services are necessary to keep USM healthy — including further transfers of innovative memory technologies. Perhaps the only tenet more dearly held by IBM than "world peace through world trade" is "a strong leader is made strong by strong followers."

The Deck Already Dealt

However, much to IBM's chagrin, another tenet may be dominating vendor's decisions to invest in USM: "Why pay between $5-50 million if you can ride for free?"

Two benefits to adjusting U.S. dependency on offshore sources of memory are commonly cited by USM: a more consistent supply of DRAM chips, and prices (presumably lower) that more accurately and in a more timely fashion reflect changing (presumably improving) economies in DRAM production.

The importance of these benefits are at least partially derived from the effects of ill-timed actions taken at the Federal level to support DRAM prices. Just as anti-dumping trade regulations requested by, chiefly, semiconductor vendors were kicking in, many of the world's producers were bringing 1Mb fabs online. The routines of product changeover in the semiconductor industry were thus made particularly difficult by artificial pricing bonds.

The Free Rider Dilemma: To Invest or Not to Invest
(Source International Data Corporation, 1989)

R&D Options for Potential USM Member	USM production	No USM production
Invest in USM OR	Lower DRAM prices, stable supply (Initial investment)	None (Initial investment)
Don't Invest in USM	Lower DRAM prices, stable supply, save initial investment	None Save initial investment

The major benefit likely to accrue to USM investors is a reliable supply of DRAM chips, and as a result, less volatile DRAM prices. However, DRAM consumers who do not finance USM's startup also stand to benefit. Price reductions stimulated by USM production will benefit all DRAM buyers, not just USM investors. For vendors considering funding USM, that differential may not outbalance the cost saving and more controllable payback of allocating tight R&D dollars to proprietary research only.

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More than supply side bugaboos worked to fluster the DRAM market though. Because half of all DRAM chips produced are used in PCs and workstations, fluctuations in DRAM demand have been highly dependent on demand in desktop systems. From 1987 to 1988, PC unit sales grew at approximately 10%, while workstation unit sales grew at approximately 60%.

However, during that same time frame, the DRAM market grew nearly 160% for the simple reason that each desktop system is shipping with more memory. For example, DOS-based PCs generally shipped with a single megabyte of memory. To run OS/2, however, a minimum of 2 MB is required. Much more is required if anything beyond the simple use of the OS/2 interface is required.

Many desktop vendors fowled their efforts to manage memory inventories, guilty of almost compulsive DRAM consumption. Oscillations in aggregate demand and product mixes led to extreme uncertainty regarding memory needs. Apple, for instance, was forced to write down nearly $60 million worth of memory inventories in early 1989.

As systems vendors gather more information about demand and product mix, they should do a better job of forecasting DRAM demand. Less-costly 256Kb DRAM chips, which have led the market in unit and revenue sales share for the last three years, have lost ground to 1Mb DRAMs. Although 1Mb DRAM unit growth should remain steady in 1990, falling prices, the result of improved yields as production learning curves are ascended, should lead to moderate revenue growth of around 15%.

Barring a similar convergence of supplier, buyer, and governmental missteps, by 1992, 4Mb DRAMs will take over the market, increasing from 37% of the 1991 market to 57% of the 1992 total DRAM market. Sixteen and 64Mb DRAMs are expected to begin shipping in 1994.

Still, USM proponents note that despite apparent successes proceeding down 1Mb production learning curves, 1Mb chip demand may still exceed supply, productive capacity is believed to remain idle overseas, and prices are believed to be higher than "free market."

USM could, in the future, be a more successful policy making tool, in matters of semiconductor memory supply, than the federal government. By directly adjusting, or threatening to adjust, its own output, USM could influence other DRAM producers to sell at or near "free market" prices.

Of course, if USM successfully acts in the best interests of American firms, it will be difficult, maybe impossible, to restrict the benefits of such actions only to USM sponsors.

Many prospective sponsors, therefore, are probably evaluating USM on how their participation could hurt, and not help, their access to DRAM supplies. Those sustaining strong relationships with foreign DRAM producers are not eager to debilitate intricate networks of memory supply lines.

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As a result, the majority of systems vendors appear to be weighing USM not in competitive terms, but in investment terms.

USM as an Investment Decision

And USM is far from a sure investment thing. For systems vendors that have already passed on a chance to sign up, and for those still in the decision making process, serious questions about USM's viability as a DRAM producer remain.

Some are leery of IBM's motives. IBM — a founding investor in USM, the licensor of the 4Mb technology with which USM hopes to enter the DRAM market, and the provider of USM's titular head — is in a powerful position to influence USM's direction and strategy. IBM is not prone to flipflopping on

Is a Successful U.S.-Based DRAM R&D Joint Venture Possible?

(Source: International Data Corp., 1989)

All over the world, semiconductor designers, manufacturers, packagers, and distributors, cognizant of imposing capital cost and technical barriers in the semiconductor industry, are forming joint ventures for entering the market. While a combination of escalating semiconductor research, development and production costs, economies of scale, experience curve, and vertical integration benefits might build a strong case for U.S. vendor involvement in joint R&D ventures in the DRAM business, market, economic, and organizational dynamics work against it. The relative failure of collaborative U.S. chip R&D ventures (such as MCC and, so far, Sematech) is almost as renowned as the success of U.S. startups. Why can't U.S. companies cooperate on Big Science R&D while their international colleagues can? Culture, lack of perseverance or patience ... maybe. The intoxicating effect of massive federal bucks, perhaps. More likely the culprit is an obsession with immediate return, and an inability to commit to long-term partnerships. The bywords for collaborative U.S. R&D efforts are still the bywords of U.S. business in general: short-term returns, which is probably more than somewhat responsible for their ultimate, and untimely, demise. Here is a partial list of semiconductor collaborations:

Joint Venture: Partners (Date Founded)	Activity
Sematech: 14 member, 136 semi-members (1988)	Manufacturing R&D
Microelectronics and Computer Technology Corporation: 15 Shareholders, DARPA (1982)	Superconductive chip R&D, VLSI chip design and packaging R&D
Tohoku Semiconductor: Motorola/Toshiba (1987)	DRAM manufacturing
National Semiconductor/Hitachi (1988)	CMOS FACT develop & distribute
Ramtron/ITT Semiconductor (1988)	Ferroelectronic manufacturing R&D
Plessey Semiconductors/Applied Micro Circuits Corp. (1988)	ECL R&D, marketing
Varian TEL Ltd: Varian /Tokyo Electron (1989)	Semiconductor manufacturing equipment production & marketing
General Signal Corp./Olin Hunt (1989)	Wafer fab equipment R&D
AT&T/Hampshire Instruments (1989)	X-ray lithography R&D
Telenfunken/Matra (1979)	SRAM manufacturing, marketing
Texas Instruments/Acer (1989)	RAM manufacturing, marketing
ZyMOS/Daewoo (1989)	Custom/standard IC design
BTU Ulvac: BTU International/Ulvac (1989)	CVD manufact. equip R&D
Intermos: Hungary /USSR (1989)	IC production
Materials Research Corp./Mitsubishi (1988)	DRAM manufacturing, marketing

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commitments, but at some point in the not-too-distant future it might find itself facing a serious conflict of interest. Big Blue is first and foremost a systems vendor, and newer memory technologies could still harness significant advantages in the increasingly competitive computer market.

Others are challenging the financial structure upon which USM is built. With capital costs in Japan running at about one half of USM's, some potential investors are souring on the deal purely for financial, and not technological or marketing, reasons.

A final barrier to USM's success is inflexibility. Competition in the DRAM business is characterized first by product innovation when features are a main selling criterion, and later by process innovation when price is most important. Each competitive position requires different strengths.

Product innovators are assembled and organized for excellence in chip conceptualization and design. Cost structures are secondary. Process innovators compete almost exclusively on the basis of their cost structures.

Making the change from competing on product to process innovations requires flexible strategic, operational, marketing, and sales structures. Whether a U.S.-based entity in the DRAM market can compete on these terms has not been proven — let alone a collaborative one. By not investing, naysayers and fencesitters may be voicing disbelief that USM can exhibit the nimbleness required to dance with Pacific Rim producers.

Conclusion

USM's success hinges on extracting enough operating capital from sources happy to ride for free. Unless nationalistic appeals are enough to compel prospects to fork over big bucks, USM must find ways to restrict its benefit stream, or to turn to the government for funding.

Tying product or technology delivery to an investment in USM would certainly sweeten the USM offer. USM could schedule supply, for either present or future chips, to favor USM investors. Of course, this might meet with legal objections.

If benefits can't be restricted, another source of funding could be the government. But Uncle Sam has heavy feet; a high-tech waltz with the Federal giant could leave all bruised, battered, and far worse for the effort.

A potential investor eyeing USM and the DRAM market has a risk and reward, make (help make) or buy, decision. Will the benefits of onshore DRAM production outweigh the cost?

Answering that question, however, involves perilous prognostication. Potential investors must evaluate the supply of and demand for DRAM chips, and examine the terms of relationships with DRAM suppliers. And it must analyze these market opportunities in light of the fact that its own potential entrance would be made via the USM proxy — an unproven, and, given the wide variety of perspectives represented among USM's sponsors, potentially unworkable organization.

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Point, Click, Litigate. After 18 months of watching from the sidelines as Apple, HP and Microsoft tossed about graphical user interface (GUI) accusations, Xerox, largely due to the arrival of Bill Lowe, has jumped into the fray. The copier giant and reluctant software claimant is the litigant most worthy of the title of owner of the ideas forming the basis of the GUI in question— the icon-based menu system developed by Xerox's Palo Alto Research Center ten years ago, used by Apple's Lisa and Macintosh, HP's New Wave, and Microsoft's Windows. What's interesting is the timing. In March of '88 Apple brought suit against HP and Msoft. In May '89, Xerox formally approached Apple about discussing some sort of licensing agreement. Apple, taking credit for building the popularity of GUIs, declined. Meanwhile, Metaphor and Sun quietly signed license agreements with Xerox. Is this an example of hidden R&D costs, or a case of a greedy repackager of found technology sticking it to a larger foe? Either way, unfortunately for Xerox, it's probably too little, too late.

IBM's Blue Holidays. The announcement that IBM would trim its U.S. workforce by another 10,000 employees (to 206,000 — 37,000 fewer U.S. personnel than in 1985) and restructure U.S. operations has been met primarily with one question: Are these actions enough? IBM says the moves will lower costs and expenses by approximately $1 billion, with the first positive effects being felt next year. Negative effects will be felt this quarter, as the company expects to take a $2.3 billion charge to reflect consolidation and capacity reduction costs, as well as adjustments to software, stock, and technology valuations on the books.

Still, many wonder why IBM doesn't end its "no-layoffs" policy, or take other equally drastic action. Moreover, rumors of unprecedented organizational trimmings in upper management are rampant. IBM is still paying for what may be history's greatest corporate expansion. To build a corporate infrastructure capable of sustaining $100 billion in planned 1990 sales, Big Blue worldwide hired nearly 140,000 employees between 1980 and 1985. IBM is most guilty of atrocious planning in the early 1980s.

Should another 50,000 employees be jetisonned, as would be normal practice in Detroit? Probably not. The computer industry is not now, nor will it ever be, like the car industry or any other rustbelt entity. Information technology systems are infinitely more complex beasts than motor vehicles, which makes for wholly different operating environments. Mass firings at IBM could have unforeseen consequences, like unionization or reduced organizational flexibility. More actions may be required to increase IBM's profitability and shareholder value. But IBM should be commended for taking incremental steps to improve its not-so-bad bottom line while keeping a sharp eye to maintaining its position as leader in the world's most dynamic and complex market.

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OSF STAVES OFF UI's V.4 WITH A SOUPED-UP MICROKERNEL STRATEGY FOR THE '90s

On the heels of the fifth Open Software Foundation members' meeting, held in Boston on November 13, some pieces of the OSF's strategy are coming clear. While OSF/1 and /2 become more clearly defined, the OSF itself is changing, experiencing what it means to be both operating system integrator **and** developer.

Unix International's successful, momentum-stealing Unix System V.4 rollout is forcing the OSF's hand. The OSF, in turn, is taking a shot at regaining industry attention with promises of a souped-up OSF/2 leapfrogging UI's Unix System V.4 (and V.4.1) with next-generation, distributed-computing operating system features. Four issues combine to make a deceptively difficult jump:

- Technology: With OSF/1 sporting the Mach 2.5 kernel, boasting "unencumbered licensing" and parading a request-for-technology (RFT) strategy, the OSF is building a strong product. Delivering on these promises through a labyrinthian collaborative process that demands coordinating dueling ideologies and technologies from afar remains a problem.

- Delivery: Even if the OSF can deliver on OSF/1, it will still be six to eight months later than System V.4, and it will be delivering a system more attractive for future development than for actual commercial use. OSF/2 is still not slated for prototype release until late 1991.

- Organizational Transformation: Suddenly, the OSF is a full-fledged software development institution. Gone are the halcyon days of coalition busting and technology begging. Today's OSF is a grind-it-out OS developer. The shift demands big changes in managing member and competitor relations.

- Jilt Factor: Rumors of defection from the OSF persist, with HP and Bull the most rumored to be considering leaving. How the OSF might cope without HP's or Bull's complete support is unknown.

The OSF is eschewing traditional commercial low-end application functionality to position OSF/2 as a next-generation network operating system of the future. Since two founding members, Digital and IBM, are relying on OSF technology for further penetration into the workstation market, the leapfrog strategy does not seem farfetched.

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However, the OSF has a long way to go. Capitalizing on vendors' and users' claustrophobia (the fear of unopenness) means more than shrewd technology and the pledge of openness. Astute politicking and carefully accelerating the development cycle must be parts of the OSF's game plan.

OSF Technology

OSF/1, still slated for delivery in the second half of 1990, will incorporate the Carnegie-Mellon Mach 2.5 kernel, as well as the Encore parallelized file system and TCP/IP. Surrounding it will be 800,000 lines of IBM AIX commands and libraries.

The OSF claims the Mach kernel will enable symmetric multiprocessing while building toward B3 security, the second highest NCSC security rating. OSF/1 is promised to provide disk mirroring and system call compatibility with Xenix, Unix System V, and Berkeley. File system technology from Berkeley 4.4 could eliminate the need to license Sun's Network File System.

OSF/2 prototypes are scheduled for a late 1991 release. OSF envisions a B3-secure microkernel (μ-Kernel) scheme geared for multiple special purpose, special architecture servers in the same box, and across a network.

For example, a compute server would contain the kernel and a network manager; a file server the kernel, the network manager and a file manager. Compatibility with existing operating systems, including OS/2 and proprietary systems, would be handled by shared libraries.

The Importance of Being Open

In its continuing pursuit of unencumbered licensing — one-stop OS shopping — the OSF has renegotiated its licenses. All licensed technology now comes free of binary licenses, significantly reducing the potential end user and vendor price.

The strategy has two intended victims ... rather, consequences. The OSF can raise a little fear, and ire, at AT&T, since OSFers would love to be free of AT&T fees. Although OSF/1, using the Mach/Encore technology, still requires an AT&T license, future developments might not. In addition, the Berkeley 4.4 threat is aimed at Sun's reportedly high NSF licensing terms.

At question is a simple make-or-buy decision, with less than simple ramifications. If the OSF and therefore its future customers decides to bite the bullet and pay the license fees, it may bring a product to market quicker than if it attempts to redesign the Unix wheel itself, or through member development efforts.

On the other hand, by attempting to avoid high licensing costs, the OSF may assume a system with expensive, built-in delays. Some OSF executives would prefer to negotiate a good rate from Sun and/or AT&T rather than investing time and money in new technology.

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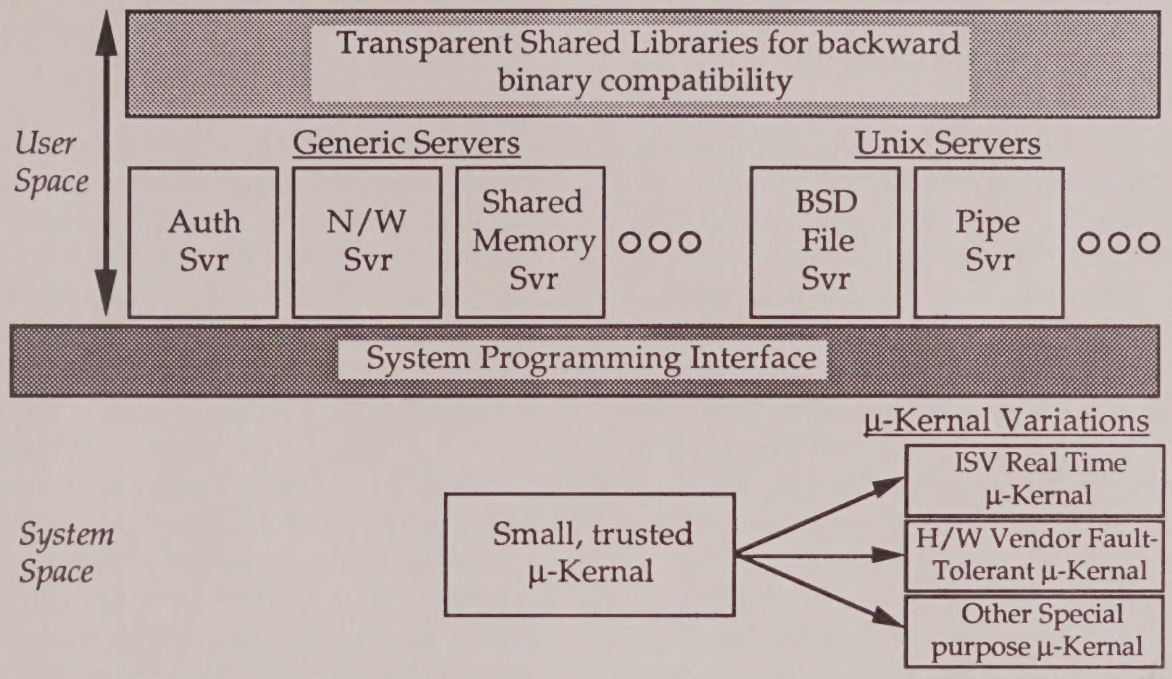
The μ-Kernel Structure Potentially Increases OSF/2 Modularity

(Source: International Data Corporation, 1989)



To develop OSF/2, standard Unix will be decomposed into fundamental elements by the OSF. At the core of OSF/2 will be a highly-secure, streamlined microkernel (μ-Kernal) comprising, perhaps, as few as 50,000 lines of code (AIX, by contrast, includes 300,000+ lines of kernel code). A rigid system programming interface will be defined by the OSF, enabling ISVs and hardware vendors to build portable server programs. Thus, for example, communication between OSF/2 systems could take place between common network server processes, each accessing machine-dependent μ-Kernel services. Moreover, it may be possible to develop program libraries used in other environments, such as OS/2, capable of executing in an OSF/2-defined user space. OSF hopes to make it possible to execute compiled binary code linked to non-Unix libraries on Unix-based systems. Heady goals indeed.

The distributed computing environment (DCE) request for technology is innovative and openly appealing. If the OSF chooses to standardize on existing technology (Apollo's remote procedure calls, for example) the DCE process will save time and money.

However, DCE may serve to unnecessarily complicate and swell the cost of construction of OSF/1 and /2 if it is unsuccessful in attracting members and developers to provide proven, existing code which can be made into standards. If the OSF is required to develop, or reinvent, code, DCE becomes a risky strategy.

Fighting UI's Thunder With Thunder

Following UI's System V.4 rollout, the OSF needed to get back in the limelight. The Mach kernel announcement provided a good forum for refocusing industry attention on OSF.

While the future direction of OSF/1 is more clear from both a technological and market standpoint, maintaining any momentum generated by these

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complex announcements will be no easy task. OSF/1 is still a year away. Delivery of OSF/2 is but a blip on the horizon.

On the other hand, AT&T may not be too far from delivering symmetric multiprocessing (SMP) and B2 security, a significant improvement over the C1 or C2 rating of currently available OSs. With System V.4 shipping, and V.4.1 likely due late in 1990, the competitive pressure is on.

First of all, the OSF must substantiate its claim that the two products meet market requirements. Then it must address the technological challenges of delivering on OSF/1 and /2 promises.

With Motorola, Sun, and Intel all separately working on SMP, and Sun developing microkernel technology, UI might compress the delivery schedule for follow-ons to V.4, and place even greater pressure on the OSF. If UI standardizes on, and licenses, SMP or microkernel technologies, OSF's leapfrog might find the lillypad occupied. Regardless, the technical challenges to OSF/2 remain large.

Same Rules, New Game

And yet the organizational hurdles facing the OSF might be even more imposing. However the OSF manages its relations with member firms, the UI set and other outsiders (potential customers and partners) will have a large impact on the ultimate success of its OSF/1 and /2 strategy.

With its plans coming more clear, the nature of the OSF's alliance with member firms has never been more suspect. The OSF/2 leap is requiring member firms, with different Unix strategies beyond simple AT&T/Sun busting, to reevaluate their thinking.

In addition, microkernels, DCE, and OSF/2 are a far cry from what members were expecting when they first bought into the OSF concept. As a result, each

OSF/1&2 Timeline

(Source: International Data Corporation, 1989)

1989	OSF/1 functional outline	Evaluate OSF/2 microkernel systems
1990	OSF/1 1st snapshots, code (bootable) 2 reference ports (Encore, DCE) OSF/1 snapshots OSF/1 functional freeze **OSF/1 available (November)**	OSF/2 microkernel prototype distribution and review OSF/2 microkernel specification published
1991		OSF/2 design and prototype complete OSF/2 integration complete
1992		**OSF/2 available (November)**

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member's reactions to the leap will vary.

Members who joined the OSF to halt the AT&T/Sun coalition may think their initial investment was well spent. Anything more, like low license fees, and next-generation distributed operating systems, is gravy.

Digital and IBM, which might have been basing 1990s assaults on the workstation markets with a commercial, robust version of OSF/1, may now be somewhat disappointed. The commercial shortcomings of OSF/1 indicate that the OSF seems to have conceded to UI in the short term.

Digital and IBM, rather than finding themselves counting on OSF/2 to propel them into the center of the workstation market sometime in 1992 or beyond, will continue developing their proprietary Unix workstation OS.

The reality of product management, margins, and mergers further clouds the waters — even the OSF doesn't operate in a vacuum. Different groups with different power bases within each large OSF member express a diversity of opinions on the OSF.

Management within the proprietary OS businesses at HP, Digital, and IBM, for example, will want to exert different pressures on the OSF than management of the Unix/DOS/OS/2 PC and workstation products. The shouts the OSF hears come in different languages, with different tones and at different volumes. European OSF members like Bull and Nixdorf, counting on a robust commercial version of OSF/1, may already be heading for the door.

Finally, outside the OSF membership base, mainstream commercial minicomputer vendors will probably appreciate the solidity of V.4, while aggressive network-computing workstation vendors recognize the benefits of the OSF plan.

As a result, forced cooperation between UI and OSF may keep either side from straying too far. However, generating anything resembling cooperation between UI and the OSF will demand negotiation and concession inside and outside the OSF. Either way, managing the OSF's leap will keep OSF technologists and strategists very busy indeed.

Compaq, NetFRAME: Overflow in the Dealer Channel?

Compaq's and NetFRAME's recently-announced local area network "server" products offer competitive price/performance compared to minicomputers and PCs. But each introduction is enveloped in positioning, delivery, and support questions that may threaten the marketability of the new products. Consider the following:

- Each vendor labels its product a server, yet no concise definition of the term, or the server market, exists. As a result, each is introducing not only a new product, but is

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infiltrating an undefined segment of the systems market.

- Each vendor flaunts "international market presence" through a series of primarily retail dealers. Yet delivering solutions through a dealer channel implies loss of account control.

- Delivering increasingly complex LAN solutions like $100,000 server boxes through dealers of variable, and sometimes questionable, technical ability may mean more than loss of control. It may mean channel conflict, and in some cases, loss of credibility.

Is the creation of a server market a part of Compaq's and NetFRAME's strategic plans? Or is the introduction of server products a natural corollary to LANs' increasing complexity and ubiquity?

Selling products in a new market involves heavy start up costs. Compaq and NetFRAME are reducing those costs by relying on an existing PC delivery channel. A more important question, then, involves whether the two vendors are equal to the task of increasing the competence of the PC delivery channel to that of more entrenched and established small- and medium-scale VARs.

The sales channel and support strategies of each vendor will make or break the products. Promoting competition, and not conflict, among dealers is a function of the vendors' ability to identify user markets and provide quality, equitable training, sales information, and technical support to their dealers.

What's So New Here?

The technology of the Compaq and NetFRAME announcements is hardly revolutionary. The idea of selling multiuser solutions through a retail channel is not unprecedented — Digital's ill-fated Business Centers and IBM's money-losing Product Centers come to mind.

However, none of the challenges surrounding the recent announcements loom larger for the would-be server vendors than selling through the dealer channel.

Some dealers and retailers would have us believe a fundamental shift in the nature of the retail channel is occurring. Businessland, for example, no longer refers to its branch locations as "storefronts." Now they are centers. Regardless of the hype, the more important question is can these guys sell and support high-end boxes?

The answer hinges on Compaq's and NetFRAME's ability to provide their (mutually exclusive) dealers with sales and support tools. Compaq, the channel marketing phenom of the decade, is probably as well positioned to do so as anyone. With 6% of the U.S. PC Unix market, and almost 8% of all U.S. PC sales in 1988, it has a legitimate claim to part of the low-end market already.

Compaq intends to build its network of PC dealers into systems

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experts with a dealer training and support program it calls Salespaq. While Compaq's dealer channel has demonstrated an ability to sell single-user PCs, its ability to out sell and out support the new competition, i.e., DG, Digital, HP and IBM, is unknown. In addition, the franchised nature of Compaq dealers such as ComputerLand and Entre further reduces the account control Compaq can exercise through the dealer channel.

NetFRAME's strategy must be viewed somewhat more skeptically. While Businessland's sales prowess in the corporate PC market is well known, topping $1 billion in 1989, its long-term ability to support high-end PC applications is not. Despite the initiation of new service and support structures and systems, as of mid-year Businessland only employed 702 sales staff and 807 support technicians, while its new minicomputer competitors employ thousands of each.

But They're Still PC Dealers!

How does a vendor induce a strategic partner to perform? By rewarding solid performance. The high-ticket Compaq and NetFRAME boxes *should* provide ample payback, in the form of margins, to generate dealer excitement.

But as LANs and associated products move out the complexity scale, away from simple interconnection of dumb devices and toward distributed processing, *dealers cannot simply decide to start selling them,* regardless of their desire. They must turn to the vendors to develop technical and sales expertise to competing with their more established new competitors.

NetFRAME's Businessland connection (president/CEO Torressi is a former Bizland vice chairman) and Compaq's stunning channel savvy, give the two trailblazers a good start. But selling multiuser solutions is not the same as selling PCs. Both companies have a long way to go in solidifying their dealer channels, the bond that glues customers and vendors.

Re-institutionalization of Dealers

The server wars will be waged in dealer trenches. The winners will be those vendors willing to sponsor and promote the transformation from hardware peddler to system integrators. And they might learn a lesson from some of their better customers.

The most effective use of revolutionary information technologies in large user organizations *necessitates* organizational change. For efficient deployment of a really new technology, organizational barriers must be shattered, and departmental responsibilities reevaluated and reassigned. Using new technologies within the confines of old organizational constraints is wasteful.

Similarly, effective sales of new technologies requires rethinking and reforming distribution partnerships. Server vendors must anticipate and induce change in the high end PC dealer channel.

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Bodies Fly From Wang. The Richard Miller-induced mayhem at Wang goes on: 2,000 layoffs in September, another 2,000 in November, rumors of further December cuts. By Miller's own estimates, as many as 12,000 employees are still involved in "non-lifeline" activities. In addition to the layoffs, the Miller revolution — Operation Customer — will restructure Wang into just two groups: application engineering and platform development. A product strategy overview announcement is due early in December. Miller's calls for "getting closer to the customer" and for "customer-partnering" sound not unlike the sounds coming from other vendors. What makes Wang any different? Installed base for one. While prospects for complete recovery — ie., strong revenue and earnings growth — are severely limited by economic and market constraints, the upside to the downside is that the bottom probably won't fall out completely unless no one pays any attention to the man in the black hood. With the sword falling so swiftly, that doesn't seem too likely.

MSoft and IBM Strengthen Bonds. A little give and take goes a long way. Using the announcement of the merger of LAN Manager and LAN Server and the disavowal of the existence of Presentation Manager Lite as a stage, IBM and Microsoft declared their union stronger than ever, and sent chills up the back of competitors. Both partners come out on top. Microsoft's Windows becomes the de facto graphical user interface for DOS environments. IBM's Communication Manager and Data Manager will now run on non-IBM platforms. In addition, the LAN Manager/Server fusion poses a threat (the first real threat?) to Netware's LAN OS dominance.

LAN VARs Form U.S. Connect. In the idea-whose-time-has-come department, six of the nation's largest LAN resellers have banded together to form a national service and support organization that will provide customers with one-stop network solutions. The six are: Gorham Clark (New York), Kenwood Associates (Chicago), Brown & Associates (Boston), Micro Computer Services (San Francisco), Winston Olson (Los Angeles) and Micro One (Dallas, Atlanta). See *the Gray Sheet* 25:5, October 30, 1989.

IBM Licenses DRAM Technology. When two more potential partners chose not to enter into the U.S. Memories' DRAM joint venture last week, it became clearer that the consortium's success or failure may well hinge on AT&T's decision to join or remain independent. AT&T may hope that if it doesn't kick in, U.S. Memories will convince enough smaller vendors to fund the start up. Either way, IBM's a winner. By licensing manufacturing technology to Micron and, possibly, swapping technology with Cypress, IBM gets chips regardless of AT&T's actions. Matters of vertical integration will be examined in upcoming issues.

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October Mainframe Madness: Digital and Tandem Join the High-End Fray

The mainframe market remains one of the most contentious and important areas of competition in the computer industry. The reason is simple: in most large customers' shops, he who controls the mainframe controls the account.

Recent efforts by Digital and Tandem point to those companies' desires to exercize greater influence over their strategic accounts. Their goal is to deliver hardware and software technologies capable of supporting an enterprise's database of record and business-critical applications.

However, IBM is not to be outdone. It, too, has introduced enhancements to its family of large-scale machines that will help it battle not only customer malaise and PCM price competition, but also defend its prized glass house domain against DEC and Tandem onslaughts.

And both would-be mainframers, Digital and Tandem, are gearing up for a tremendous high-end thrust. However, in the slow-growth mainframe market, the two entrants will be trying to scale barriers others have found formidable, while facing shipment revenue constraints that others have found suffocating. Consider the following:

Entry Barriers —

- Absolute cost hurdles: With immense R&D outlays (over $1 billion for VAX 9000), the up-front expense of creating a mainframe-class product and strategy is enough alone to inhibit potential mainframers.

- Switching costs: Data and applications migration costs serve to tighten the bond between vendor and customer, and make experimenting with alternative suppliers all but impossible.

- Daunting experience curves: The process of building mainframe-class sales, service and support organizations involves a complete shift in corporate image, not necessarily simply changing hiring practices.

- Image: Customer wariness on bet-the-business mainframe purchases results in exceptionally tight scrutiny of any potential mainframer.

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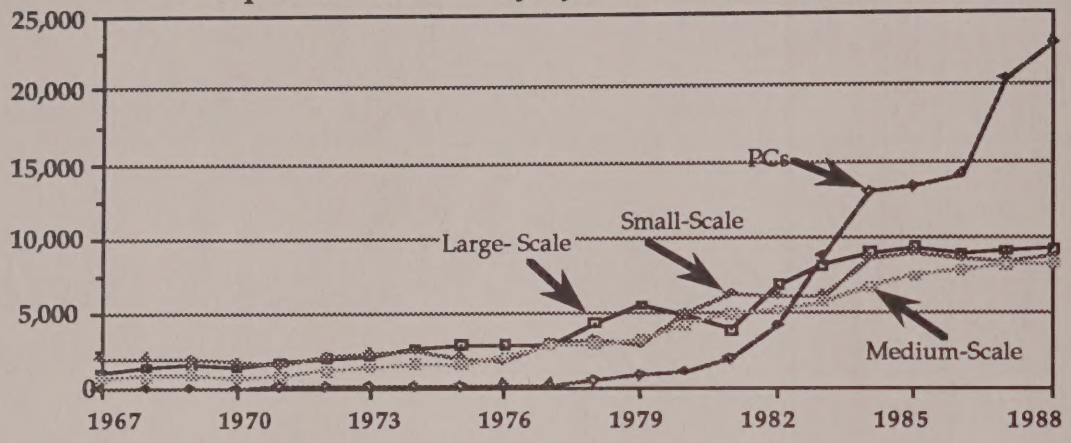
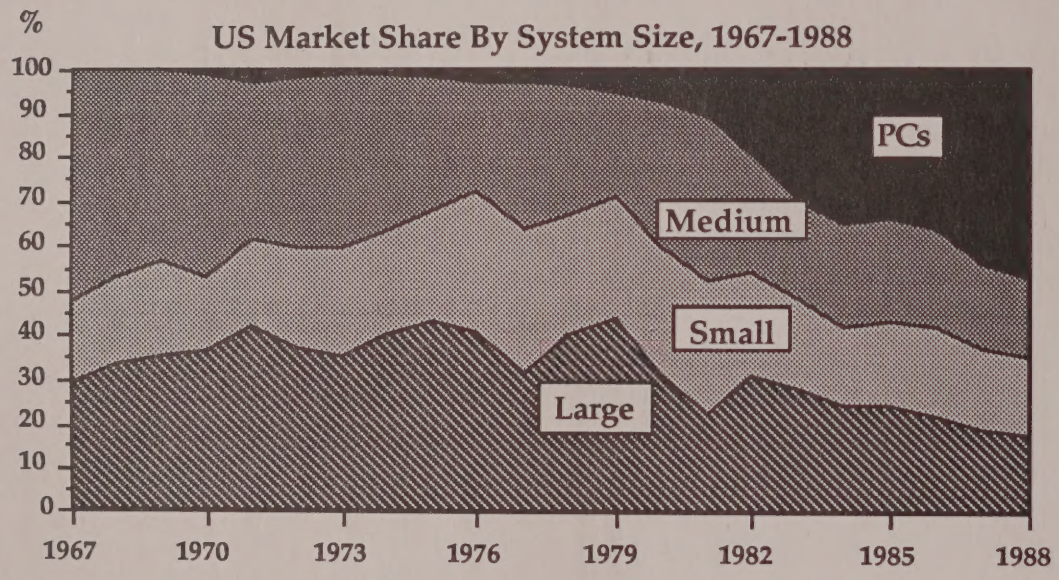
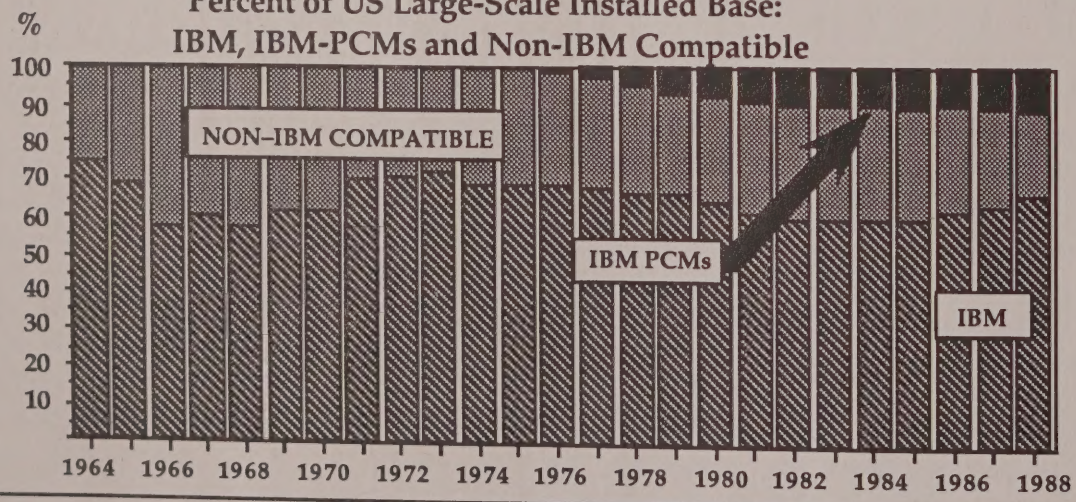
US Shipment Revenues by System Size, 1967-1988, $M



US Market Share By System Size, 1967-1988



Percent of US Large-Scale Installed Base: IBM, IBM-PCMs and Non-IBM Compatible



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Revenue Realities —

- Compound annual growth of the large-scale system market has crawled along at only 2% in the U.S., and 7% worldwide, since 1983.

- Non-IBM-compatible large-scale systems vendors have not been keeping pace. Their share of the installed base has fallen from 42% to 22% between 1968 and 1988.

Are the entrants riding a rising tide of expanding international mainframe markets? If so, how will other vendors be affected? Or, more likely, are vendors entrenched in a zero-sum battle, finding new business only by scrapping with large and small competitors for tenths of market-share points?

As far as technology goes, both Digital and Tandem have delivered credible products. Although each company brings a different set of distinctive strengths, its success may depend more on an ability to develop coherent mainframe-class data and software migration programs, as well as sales and service organizations, rather than just capable hardware platforms.

Market Dynamics

Entry barriers create pockets of intense competition between traditional adversaries. Barriers to the mainframe market — including the magnitude of the requirement for data and applications migration tools and systems, and the skepticism with which potential mainframe buyers make bet-the-company decisions — make the mainframe business no different. Mainframe vendors are locked in an ongoing struggle to retain market share points.

As a result, the mainframe market is characterized by competition based on retaining presence in accounts. Systematic product upgrades, rather than wholesale replacement, are the favored way of tightening the bond between customer, who holds a heavy investement in machine-specific data and applications, and vendor.

In this light, IBM's predictable 3090 kicker announcements are an effective way of staving off competition. With R&D expenses spread across larger revenue bases, and migration issues rendered moot, IBM's matter-of-fact upgrade routine is a powerful defense against smaller competitors.

From a new business standpoint, when the imposing entry barriers to the mainframe market are combined with sluggish overall mainframe growth, mainframer prospects look mighty bleak. Technological substitutes, in the form of ever more powerful smaller systems, are increasingly siphoning off traditional mainframe applications, flattening mainframe growth.

So why do DEC and Tandem want in? The answer lies in the intangible and implicit leverage that accrues to the mainframe vendor of choice in any account. With mainframe — and the ensuing programming, service and

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support personnel — presence, vendors are able to exercise significant influence over the buying patterns of their customers.

Still, the barriers remain imposing. Even for Tandem, with acknowledged expertise in delivering fault-tolerant OLTP solutions in competition against IBM S/370 systems, and Digital, with an impressive installed base of superminis, cracking the mainframe market means acquiring new skillsets, introducing new technologies, and fostering corporate agility in order to coordinate resources and respond quickly and efficiently.

Digital Displays High-End Pluck

Yogi Berra might say, "It's deja-vu all over again." Once more Digital is throwing itself against the mainframe wall, only this time the 9000 seeks to go where no previous Digital large-scale system has gone: out the door.

By building on Digital's huge supermini installed base and considerable software and data migration experience, the 9000 has more of a chance to do so than its predecessors. With the success of VAX superminis, Digital has become a master at managing the shared account. However, the keys to success for the 9000 involve building new reputations on unproven technology, not merely leveraging account presence.

Digital's abortive attempts at entering the large-scale market have been unsuccessful for a variety of reasons. Only 23 PDP-6s were ever sold, because although the machine introduced time-sharing, it was a technology searching for an application. The PDP-10 and DECsystem-10 and DECsystem-20 never gained the volume Digital anticipated, and DEC couldn't justify supporting a high-end system incompatible with mainstream VAX offerings.

While preconfigured VAXclusters, of four or eight 8700s were *called* mainframes, VAX 8600, 8940 and 8980s sold in VAXclusters were "more than a mainframe." The ***Gray Sheet*** didn't buy it (22:18, January 18, 1987), and due to I/O constraints and requirements for single-image processing, neither did most customers.

I/O performance, long the Achilles heel of VAX systems, has been dramatically improved by several mainframe-like hardware features. Indeed, perhaps to cut down on R&D costs, Digital has structured the 9000 in a way highly reminiscent of IBM's biggest machines.

The 9000 line addresses I/O weaknesses and single-stream, single-image performance problems of the 8700s with an air-cooled, quadprocessor, six-stage pipelining architecture. A System Control Unit supports as many as four simultaneous 500MB/s data transfer channels, providing 20 times the bandwidth of the 6000.

The 9000 will run a new version of VMS, available in mid-1990, supporting XMI-based I/O devices, multiple CI interfaces, vector processing, and reliability enhancements, including sup-

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port for "soft failures" of CPUs and vector processors in multiprocessor 9000 configurations.

As a reflection of Digital's growing emphasis on the reliability of VMS, the 9000 roll-out was used to announce the VMS Production Systems Program, an initiative designed to extend and enhance VMS to better support distributed, mission-critical applications.

Digital is recasting VMS as a production system capable of handling commercial, technical, online transaction processing (OLTP), batch, and time-sharing applications in a distributed, reliable environment. VMS PSP is the first firm indication that Digital is positioning VMS as a true mainframe-class operating system.

Critical to this effort are Digital's attempts to imbue VMS with much more sophisticated system management capabilities. Using third-party products (e.g., Computer Associates' Netman), Digital is aiming to bridge the DEC-IBM glass-house gap by offering IBM look and feel for seasoned IBM data center personnel.

While the VMS upgrades do not bring true fault tolerance to VAX systems, they can substantially increase availability, reliability, and uptime of VAX multiprocessor configurations.

The VAX 9000 is well suited to compete in three areas against three chief rivals: general-purpose mainframes (IBM), high-performance technical computing (Convex), and OLTP-intensive applications (Tandem and IBM).

With the 9000, Digital avoids some entry barriers while others remain intact. The large VAX installed base reduces switching and migration costs, while heavy development and introduction expenses, intimidating experience curves, and Digital-as-mini-vendor-only problems remain.

The key challenge for Digital is to address the last two barriers. Only by carefully building mainframe-class organizational systems, and by demonstrating reliable competence in providing mainframe solutions will Digital begin to crack away at the market share of other mainframers.

The Vortex of Tandem's Whirlwind

Whereas Digital hopes to step into the mainframe market easily from a staircase built of supermini installations, Tandem, on the strength of Cyclone, is uniquely positioned to vault barriers to mainframedom.

The company's CLX and VLX systems have been strong performers in the OLTP market, a fact borne out by numbers.

Since 1980, compound annual growth is over 35%. For FY1989, Tandem accrued revenue of $1.6 billion, up 24% from FY1988. In minicomputer markets that recently have been relatively flat, Tandem's fault-tolerant OLTP strategy has shone while other strategies have faded.

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Fueled by the IBM imprimatur, a merging of the mainstream high-end commercial and heretofore niche OLTP markets is under way. The most critical challenge facing Tandem in this new competitive environment is to efficiently locate and respond to burgeoning opportunity. Success will require the right mix of products and programs to be combined with the right mix of organizational structures, personnel, and corporate skills.

On the program side, Tandem has been busy adding batch and query capabilities to its transaction processing software (Release 2 of NonStop SQL) introduced earlier this year. As a result Tandem can sell itself as capable of supporting the three major modes of commercial processing.

On the product side, Cyclone, the new high-end processor, is a system designed to deliver mainframe-class throughput without sacrificing compatibility with existing Guardian-based systems and applications. The result: Tandem's Guardian environment, from the low-end CLX through the VLX to Cyclone, covers a 300-fold performance range with no compilation required — about 30% better than IBM's broadest range.

Cyclone doesn't change Tandem's approach to fault-tolerance. But it decreases the possibility that faults that need to be tolerated will occur. Processor MTBF rates have been nearly doubled. Independent processor buses ensure fault-tolerant interprocessor communication.

The success of the Cyclone, as with all other Tandem products, depends on its positioning vis-a-vis IBM. Tandem executives have indicated that 85% of their competition is IBM (including Stratus boxes resold as the S/88), 10% Digital (even with DECtp still in its embryonic stages), and 5% everybody else.

Cyclone significantly improves Tandem's competitive position against Big Blue, but the ***Gray Sheet*** does not expect the new machines to more than marginally affect IBM's mainframe business:

- In most shops large enough to consider a system the size of Cyclone, an IBM architecture is already firmly entrenched. IBM's customers are unlikely to initiate a major migration of existing software applications from IBM-compatible platforms to the NonStop environment for no other reason than to escape the cost of IBM hardware. PCM vendors, like NAS or Amdahl, will probably continue as the best alternative for customers looking to enhance bargaining positions with IBM.

- In those IBM shops considering a large migration from VSAM or IMS flat files to relational data structures, Tandem has a better opportunity. To date, DB2 has proven most attractive to IBM's largest users. IDC estimates that DB2 is currently installed on just under 25% of IBM's 308X and 3090 machines. Moreover, in anticipation of Summit and further IBM efforts to integrate MVS

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and DB2, SIR projects that over 60% of the high-end S/370-compatible machines will be running DB2 in the 1993-1994 time frame.

- Tandem can not offer potential customers migration services, either in the form of software tools, methodologies, or consulting expertise; nor has it firmly established partnerships with software or professional services houses in positions to assist user migration efforts. This is a major negative for Tandem's Cyclone marketing and sales effort against IBM. In the MIS community, major software conversions and system migrations are generally avoided. If Tandem wants to effect a large dent in IBM's mainframe business, it should strive to introduce solutions for lowering customer switching costs.

Other than at existing VLX sites, the *Gray Sheet* believes Tandem's best Cyclone opportunity is in the non-IBM mainframe arena, either older Bunch sites or emerging high-end Digital sites.

Until now, Tandem has successfully competed against IBM in these environments, although it must carefully choose when and where to compete. IBM can muster far greater sales resources than Tandem and generally has far greater sales coverage.

IBM's Nondenial Denial

IBM's announcement of 7-14% performance improvements of ES/3090 J and JH models over previous S models, without price bumps, was not a response to either Digital's or Tandem's high-end announcement — "it just happened to work out that way." It is reminiscent of how a jealous family dog competes with her new puppy for attention and affection, as if to say, "Let's not forget who's boss here."

The performance improvements to the J series, relative to S series models, is unevenly spread across the family and derives from a variety of sources.

Performance of low-end models is improved by from 19-49% by enhancements to the 3092 processor control units, and incorporation of the fast-path data path between memory and processor. Performance of high-end models has been boosted by from 8-14% by cycle time improvements, and by increasing the high-speed buffer to 256K.

In addition to the upgrades, MVS/ESA-extension Hiperbatch is capable of improving batch performance for certain workloads by up to 60% by moving pages of data between expanded and central storage. There is little compelling reason, besides satisfying the principle of maintaining hardware currency and receiving the small performance boosts of the J series, why users will undertake significant 3090 upgrades.

IDC has maintained that IBM's high-end strategy is based on numerous, regular and incremental expansions of 3090 hardware and software capacity. It's a strategy that makes sense: IBM eases cash flow and cus-

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tomers can gradually adopt new technologies without overwhelming their critical installations.

IDC estimates that in another 12-15 months IBM will introduce another family of ES/3090s. If Summit is to be introduced in early 1991, the last major ES/3090 will probably be made in concert with the Summit announcement.

Building a clear path to the Summit, each announcement will be made with the intention of keeping users in the IBM fold by minimizing the FUD factor, and by carefully growing systems to keep up with their growing demands. A conservative strategy coming from a conservative company. Even in the light of strong technological challenges from two hearty competitors, 67% of the U.S. installed base still looks pretty good.

Conclusions

Cracking the rock-hard mainframe market is a software, data migration, and support problem. To date, neither Digital nor Tandem has demonstrated the types of migration tools, the commitment to critical mass staffing, or professional services expertise necessary to address these critical truths.

Each vendor's product will undoubtedly find success in established accounts seeking modular upgrades. And these sales may sufficiently offset developmental and staff-ramping expenses.

But the big money, and the big opportunity, for both Digital and Tandem derives not from begging among their installed base, but from unabashed stealing from the IBM and Bunch worlds, an activity which must, for the neophyte mainframers, be founded on expensive enhancements to sales organizations, customer operations support teams, professional services offerings, and technical support personnel.

In the mainframe market share game, established players have had, in some cases, 25 years to fortify relations with their installed base. Prying customers loose will require more than *Wall Street Journal* ads and glossy literature. New levels of absolute technological performance within each vendor's architectures are not enough.

True, both new products are, technologically speaking, very sound. True, both Digital and Tandem enter the mainframe foray with distinctive strengths which mitigate entry barriers. And, both benefit by having existing installations from which to bridge the unfriendly seas of competition.

However, there is little evidence of a rising tide sweeping onto the shores of mainframeland. Rather, Digital's and Tandem's entrance will exacerbate already tense market share conflicts. And make no mistake: entrenched mainframers' blase attitudes are more ruse than reality. Whether IBM, PCMer, or Bunch, the older guard will react to Digital or Tandem explorations on their customer base with the swiftest and strongest defensive measures. The prospects of a worldwide economic downturn should only throw gas on the already volatile situation.

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DOUG McLEOD, EDITOR OCTOBER 30, 1989 • VOL. 25, NO.5 PATRICK J. MCGOVERN, PUBLISHER

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Downsizing Caveats: The Necessity of LAN Support

Why downsize? Because it could save big money. More powerful networked PCs and servers offer better price/performance than traditional small-, medium-, and large-scale batch and timesharing systems.

But application costs are more than just the sum of hardware costs. While PC vendors enjoy the fruits of a market hungry to build applications on networked PCs, more and more users are finding that supporting local area networks is capturing a greater proportion of system cost.

Significant strategic caveats, many the result of rising LAN support costs, lay hidden within the downsizing trend. Consider the following:

- LAN users will not run mission-critical applications on their LANs unless vendors can demonstrate proven ability to support LANs.

- Seamless LAN support across hardware platforms, operating systems and application software, will become a requirement for LAN vendors.

- Unfocused LAN support strategies will be only marginally successful. Small LAN VARs and small specialized LAN resellers will surely feel the squeeze.

- Providing LAN support necessitates providing software support. Keeping skilled, affordable software support technicians is a very imposing barrier to the development of LAN support services.

Leveraging existing support structures, field personnel, and software support centers into LAN support services is only the beginning. A LAN support strategy involves more than simply recognizing the double digit — almost triple digit — growth rates of the LAN support market.

With LANs carrying different criticality loads, and with the growth of more complex LAN configurations, support providers need to articulate clear support plans. Service level, pricing, vertical application targets and multivendor support capability issues must be addressed before leaping into the LAN support market.

Downsizing: LAN Numbers ...

Nowhere are the effects of downsizing more clear than in the shifting balance of U.S. system sales. In 1980, PCs represented 7% of the U.S. sys-

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tems market, with the remainder evenly split between large-, medium-, and small-scale systems. By 1988, PCs captured 47% of the U.S. market, growing at an annual rate of 46%, while multiuser systems revenue grew only 9% yearly.

Combine the fact that in 1988 half of all U.S. systems revenue was derived from PCs with IDC's projection that by 1993 half of all PCs will be connected to a LAN, and the importance of PC networking becomes clear.

And this importance maps directly into dollars. IDC values the 1988 U.S. LAN market (interface cards, cable, software and services) at almost $3 billion. By 1993, when fully 50% of all PCs in non-home use will be connected to a local network, it's expected to grow to over $6 billion.

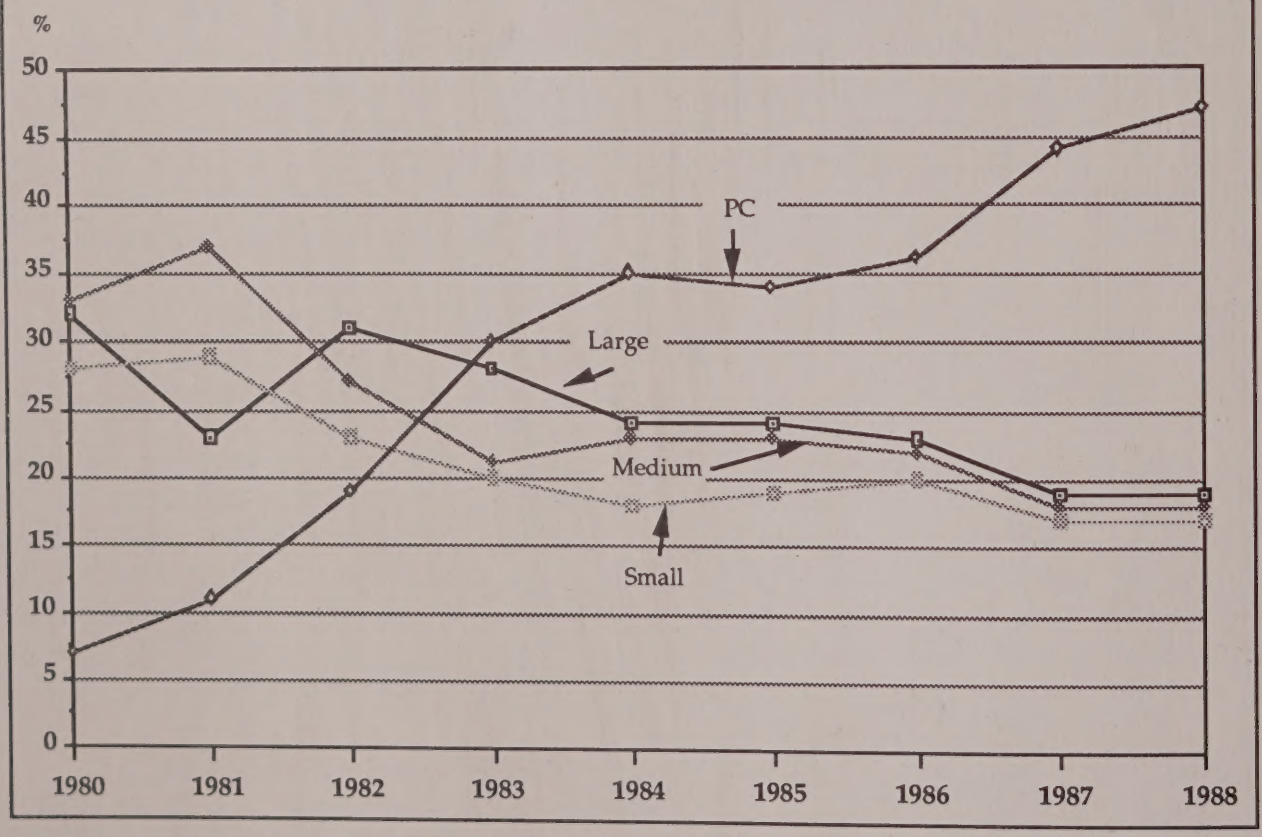
... And Channels

The growth of low-end solutions stimulates more than simple cause and effect changes. Whereas 77% of medium-scale systems are sold directly by manufacturers, 83% of PC products are sold through a distribution channel of at least one step.

In this environment dominated by

U.S. Market Share by System Size Class, U.S.-Based Vendors, 1980-1988

(Source: International Data Corporation, 1989)



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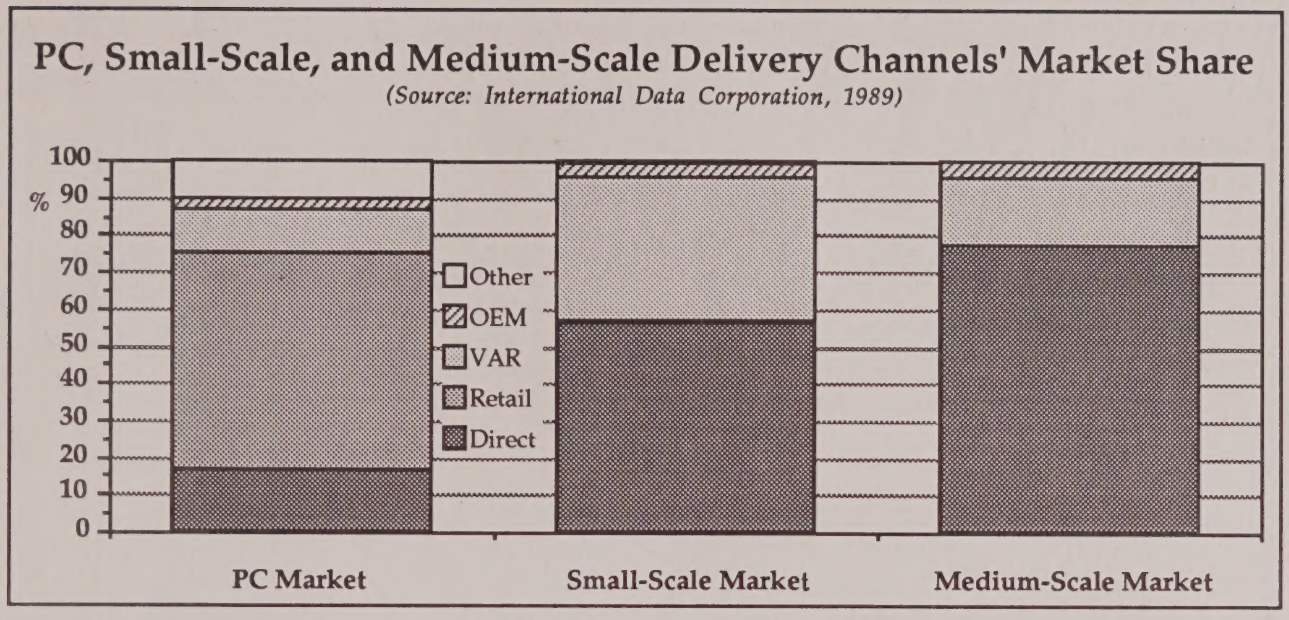

channels, coordinating the resources required to support increasingly complex PC networks becomes problematic. Partnerships and support relationships must be nurtured and continually monitored, whereas in multiuser systems markets, vendors can bolster support organizations simply by hiring additional personnel and providing improved training.

Thus, support questions raised by LAN downsizing are predominantly channel questions. Selling LAN support through the dealer channel is like pushing rope: difficult and frustrating.

Demand for LAN Support

The LAN support market has evolved through two distinct phases and is entering a third.

In response to the high cost of hard disks and printers, the first PC LANs came to market around 1980 as peripheral sharing devices. Support generally consisted of little more than depot, or retail, hardware service.

Around the middle of this decade, users began demanding more functional office automation capabilities, including electronic mail and more complex file transfers. LAN operating systems were developed that extended LAN function beyond simple peripheral- sharing software.

But the support requirements remained fairly simple. Users were offered software support through retail dealers or VARs, or technical hotlines to the manufacturers.

Today's LANs are on the verge of client-server computing, running groupware, and managing distributed databases. They resemble their predecessors in name only, and are functionally comparable to small- or medium-scale systems – and they require similar levels of service.

Systemwide support of network hardware and software, such as operating sys-

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LAN Support Evolution: 1980-1992 and Beyond
(Source: International Data Corporation, 1989)

	~1980	~1986	~1992+
User Needs	Sharing of Relatively Expensive Peripherals	Office Automation E-Mail	Substitute, Inexpensive PC-Based Solutions
Technology	Disk and Printer Servers Serial Connectivity	Network Operating Systems	CLient/Server Architectures Emerging Software Technologies: Distributed Databases, Groupware
LAN Support Requirements	Hardware-Oriented Retail and Depot Repair Services	Software-Oriented Dealer and Vendor Hotlines	Integrated, Seamless Hardware and Software Support Services

tem and applications programs, is a key requirement for downsizing users. Devoid of great expertise, they rely on the dealer channel for technical support.

However, users reporting problems often cannot identify and communicate whether the problem is hardware or software related. In-house support centers may be unaware of the range of applications running on isolated LANs, and therefore may be unable to support them.

As with any rapidly growing market, matching the demand for LAN support requires that suppliers grow and change their products with the market. However, changes in the LAN support market are occurring so rapidly that getting off the ground requires determination and daring.

Appropriate levels of LAN support can spell the difference between the success or failure of the LAN purchase. The question remains, how will support be delivered through the dealer channel? Three trends are combining to disguise the answer to that question.

Support Nightmares

The increasing complexity of LAN configurations creates real problems. Support providers can choose either to perform all maintenance and support themselves or to subcontract.

In order to supply hardware and software support, VARs and third-party maintainers (TPMs) must be able to coordinate the repair of dozens of types of PCs, peripherals, and board-level components. The ability to provide third-party service on an expanding variety of equipment involves huge inventory carrying and training costs. In addition, guaranteeing turnaround on a wide range of hardware is risky.

To provide comprehensive software support, providers must also be able to troubleshoot and provide problem res-

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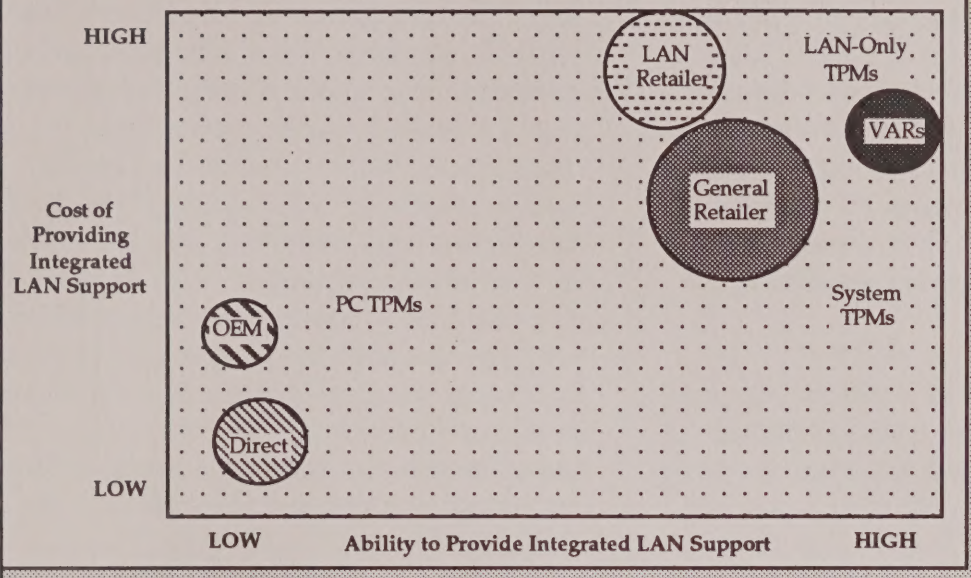
Picturing the LAN Support Market

A Taxonomy of the Trends in LAN Support
(Source: International Data Corporation, 1989)



The above figure describes how the supply of LAN support is changing. It reflects trends affecting providers of LAN support and indicates that providing inexpensive, comprehensive LAN support is difficult – and getting harder.

The vertical axis measures the cost to the support provider of providing multivendor LAN hardware and software support. The horizontal axis measures technical ability to provide a high level of hardware and software support.

For example, manufacturers of LAN equipment, since they developed the LAN equipment or software itself, have a relatively inexpensive supply of highly qualified support personnel.

However, this expertise is directed toward supporting only their own products. Therefore, manufacturers also have a relatively low ability to provide comprehensive multivendor LAN support. We place them in the lower left portion of the taxonomy.

Reflecting a lack of inexpensive full-service offerings, the lower right quadrant, where providers of relatively low-cost and high technical competence LAN support providers would reside, is empty.

Moreover, the trends discussed here are pushing support vendors into the upper left quadrant. The cost of providing multivendor LAN support is increasing (pushing "north"), and the level of technical expertise required to support multivendor LANs is increasing (pushing "west").

The size of the balloons reflects relative importance, in terms of LAN shipment market share for 1988, of different LAN delivery channels.

Third-party maintainers are broken into three categories. PC TPMs provide remedial hardware service only on a variety of low-end PCs. System TPMs provide hardware service and limited software support on a wide range of hardware. LAN-only TPMs provide hardware maintenance and LAN operating system and application support.

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olution services on a wide range of network operating system and application software.

However, providing comprehensive software support is extremely labor-intensive. LAN software and customer engineers, in short supply, command starting salaries approaching $50,000. Keeping software support personnel current on ongoing software releases and updates also requires continual, expensive training.

The alternatives to providing in-house hardware and software support by subcontracting are less expensive but riskier.

Subcontracting necessitates auditing subcontractor quality, a difficult job. In addition, while training and inventory costs are eliminated by subcontracting, contract holders may have difficulty in guaranteeing service turnaround times when they are not actually doing the repair.

Augmenting in-house support with subcontractors can be an effective way of increasing service without exorbitant costs. However, such a strategy will be satisfactory only if the contractor is able to maintain quality relationships with subcontractors.

Building these relationships entails precise advance negotiation and agreement on expected levels of different types of support: on-site response time, hotline technical support, parts availability, geographic coverage, and extent of coverage, among others.

The Flame Under LANs

Mission-critical applications are a flame burning under the LAN platform. Without comprehensive LAN support services, users will be reluctant to install any applications, to say nothing of missio- critical applications.

The pressure to provide quality LAN hardware and software support, even in the most complex of installations, is intense, and growing. It requires LAN support vendors to compete with minicomputer support programs by guaranteeing response and uptimes, and by providing knowledgeable support personnel at a single contact point.

LAN support is still based on the multitiered PC support model, rather than the one-stop minicomputer model. Seamless support is not yet available for LAN users. Endusers accustomed to vendors guaranteeing uptime and turnaround time will not accept current PC-level LAN service standards.

Current LAN support is typically fragmented between software and hardware, and even between different hardware service providers. Support of applications running on a LAN can involve contacting a host of support providers, from hardware manufacturers, system integrators, or resellers, to software manufacturers or local software customizers.

As PC LANs support more critical applications, it becomes necessary that they be supported more like their more powerful minicomputer competitors.

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Price and Margin Erosion

Two forces are combining to place intense margin pressure on LAN VARs and dealers: decreasing cost of LAN technology and widening of LAN delivery channels.

However, while the prices and margins have decreased, the costs of supporting LAN hardware and software products have not. As a result, small VARs and LAN specialty resellers are being squeezed from the LAN support market.

Decreases in the per-node prices of LAN hardware have averaged approximately 5% per year since 1985. With smaller list prices, dealers receive smaller margins. The widening of LAN delivery channels also decreases LAN resellers' margins.

According to some resellers, overdistribution of LAN hardware and software is epidemic, resulting in severe price competition between resellers.

While LAN hardware and software manufacturers control the growth of authorized channels, they continue expanding the number of authorized dealers. Their rationale: to sell more product and to gain market share and customer loyalty.

However, the strategy may backfire. By flooding the market, resellers compete with each other, and the manufacturer, at very few points over cost.

Decreasing margins on LAN hardware and software diminish the ability of LAN resellers to provide quality support. LAN dealers and VARs get less revenue from each sale, while support costs remain steady, or increase. LAN support becomes a bargaining chip, driving support prices even lower.

While manufacturers are optimistic that problems in the dealer channel will be ironed out, VARs and dealers are not. They assert that decreasing margins are driving small, full-service VARs out of the LAN business.

The beneficiaries of this trend are larger LAN VARs and LAN TPMs. LAN VARs that can establish a critical mass of support business to sustain support staff will offer a more complete solution to potential new customers. LAN TPM's will find a new market in the customers whose original LAN dealer can no longer support the growing, changing equipment on the LAN.

Marching on?

In the words of the CEO of one major LAN reseller, "providing LAN support is the hardest job in the industry."

An earlier *Gray Sheet* examination of downsizing (24:11-12, December 9, 1988) stated that despite the trends, major medium- and small-scale vendors would probably survive, even as downsizing marched inexorably on.

Until LAN support is comparable to that of small- and medium-scale systems, downsizing will march on, but perhaps slightly out of step with the needs of the market. And, in some cases at least, the lack of LAN support could be the roadblock to slow that inexorable march.

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DCA – 3COM. One year ago this month, an unsolicited letter arriving on 3COM chairman William Krauss's desk proposed the opening of merger talks between 3270 board manufacturer DCA and LAN supplier 3COM. Last week's revelation that DCA had picked up 15% of 3COM's outstanding stock comes as no surprise, then, despite DCA's uninspiring earnings of late. DCA is merely persisting in its efforts to court 3COM, which still wants nothing to do with the idea. Doug Gold, IDC'c manager of LAN research, tells the *Gray Sheet* that DCA's recent efforts to acquire technology are "tantamount to throwing dirt on a decaying corpse." We hope things aren't quite so bleak in Alpharetta.

CDC EXITS TP BUSINESS. While DEC and HP beef up their third-party service and support operations, CDC's drive for profitability has resulted in the sale of all TP business (1988 revenues approximately $85 million) to Bell Atlantic, Sorbus's parent. While terms were not disclosed, we understand that a "significant" proportion of CDC's 1,000 TP employees will make the move to Sorbus. IDC's Customer Service Program has seen enough consolidation in the service business to believe that Sorbus is primarily interested in account leverage.

PRIME CARVES AWAY BEEF. Some white knight. Prime's new J. H. Whitney-appointed management has lopped nearly 2,000 heads in a major reorg. Some may question whether the cure was more painful than the disease.

BOLD FONT WARS. In spite of the allegations and misrepresentations, the winners coming out of the Seybold Desktop Publishing conference are users, with one or two caveats. The end result of increased competition, in this case between Adobe, Apple/Microsoft and Sun, will, as usual, be price reductions (Adobe-licensed boards drive up the cost of a laser printer by about $500), and the acceleration of the development of beneficial, usable technology. While performance of the Apple/MS Royal system may lag behind Adobe, bringing its viability into question, the largest stumbling block remains the conversion of and transferability between competitive fonts.

ZENITH SHIPS PC UNIT TO BULL. HDTV hype has industry pundits forecasting the convergence of PC and consumer electronics businesses. Meanwhile, at least one manufacturer firmly planted in both camps has deigned the obstacles too great and the stakes too large to continue. Zenith's decision to sell its decreasingly successful PC business and to focus on HDTV research and consumer TV markets gives it a lean, mean balance sheet. It also flies in the face of popular prognostications that PC/TV is the desktop of the future. As Sun and TI team up with the Sarnoff center, Zenith breaks in the other direction. Look for more on PC/TV in coming issues of the *Gray Sheet*.

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DEC response imminent, Page 8

IBM's AD/Cycle: SAA's Enforcer

The *Gray Sheet* has maintained that even if IBM successfully delivered all Systems Application Architecture components, an integrated software ediface would emerge only if the market adhered to SAA tenets (see the *Gray Sheet*, 24:10, November 18, 1988).

At the March 1987 announcement, IBM's SAA message centered on application portability across strategic IBM platforms: MVS, VM, S/3X, and OS/2. Nowhere among the components introduced were interfaces, protocols, and conventions for managing software life cycles within SAA. Yet, however admirable an objective is software portability, without services in place for integrating and coordinating SAA development processes, no one could be faulted for not investing time and energy in SAA.

The September 19 announcement of AD/Cycle, IBM's framework for SAA application development, switches the focus of SAA from application portability to application integration on three levels, each reflecting different objectives:

- Integration between business objectives and requirements (critical success factors) and the IS function. The objective is to facilitate the delivery of strategic information systems.

- Integration of application development resources, including business knowledge, technical knowledge, tools, computers, and methodologies. The objective is to increase flexibility, programmer productivity, and quality, thereby reducing the backlog and development turnaround time in the application development environment.

- Gradual integration of the application code base. The two objectives are lowering development/maintenance costs over time while protecting existing software assets, and gaining flexibility in system implementation to take advantage of newer, better price/performing technologies — a return to the issue of portability.

In theory, the framework is comprised of a process mechanism for enforcing consistent software engineering practices across the life cycle, sets of life cycle tools, and a platform delivering common services to tools supporting the SAA Common Programming Interface (CPI). The framework should ultimately be implementable on combinations of either MVS, VM, or AS/400

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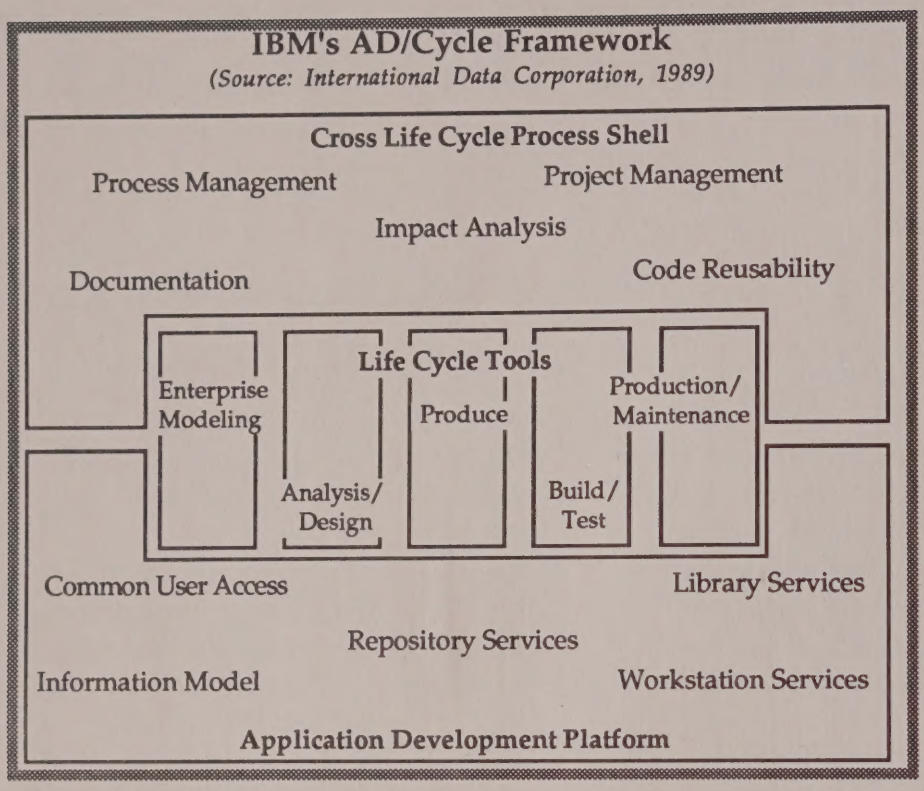

hosts in cooperation with programmable workstations.

In practice, AD/Cycle hardly delivers all missing SAA pieces, but it promises enough of them so that large portions of both the demand and supply sides of the computer industry will begin meaningful exploration of where, when, how — and how much — to invest in SAA.

The Cross Life Cycle Process Shell

Users should be able to employ the right agent, whether human or tool, for performing development work at the right time within the life cycle without undermining the status of application work-in-progress — which, in the case of software, is ongoing so long as the application is operational.

To maintain consistency, quality, and productivity in shared development environments, yet without sacrificing flexibility, the AD/Cycle framework largely separates the descriptions of process tasks, tools, and checkpoints from the specifications of process and project sequences. Thus, newer, more productive process technologies can be introduced into the development environment with minimal disruptions to life cycle methodologies.

IBM's shell for managing complex cross life cycle functions, such as those where large teams of developers are accessing the same development data, is supported primarily by five classes of tools.

Process management will initially be provided in the MVS environment by ADPS, the process manager found in ISPF/PDF. The OfficeVision project management component, AS/PAS, supports project management. Additional tools for impact analysis, automated documentation, and identifying, capturing, and inventorying candidate code modules for reuse will

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be introduced across AD/Cycle target environments.

Life Cycle Tools

Numerous software development life cycle models exist. IBM has structured AD/Cycle on a rather generic five-phase life cycle that stresses the need for initial data structure and data flow planning and modeling.

The initial, and preeminent, phase is enterprise modeling. Business entities, relationships, and rules dictating work flows are identified as strategic to an enterprise's information system. It is critical to note that entities at the enterprise modeling level — like people and capital — are not programming abstractions. Here, discussions of the information system center on its role in the business, and not its technical representation.

Details of the information system's logical structures are developed during the analysis/design phase. Strategic information system components and flows are mapped into data models and data flow diagrams suitable for guiding programming efforts.

Code is fabricated in the produce phase, either using language, generator, or knowledge-based tools, depending on the technical requirements of the application and the overall system constraints.

The application under construction is tested and integrated into the overall application and data portfolio in the build/test phase. The focus is on programming details, like scheduling, resource requirements, and security.

In the production and maintenance phase, operational routines and software fixes are applied. However, the production/maintenance phase can also be, and often will be, a launch pad for additional "radical maintenance" that might otherwise have been regarded as new development. That is to say, the life cycle really has neither beginning nor end.

The Application Development Platform

Five common services will be delivered by IBM as part of the AD/Cycle application development platform (ADP).

The first is the common user access of SAA. Users of tools within the AD/Cycle framework can be provided with a consistent look and feel across the life cycle, which should greatly increase developer familiarity with components and lower learning curves.

The second is cooperative processing links enabling highly functional, graphics-oriented developer windows into host-based tools to run on lower-cost OS/2 EE personal development workstations. Initially, this capability is provided by extending ISPF/PDF library functions to the workstation via the OS/2 EE 1.2 Workstation Platform (WSP) component of an enhanced ISPF/PDF 3.2 for MVS. As IBM further delivers on the Common Programming Interface Communications (CPIC), increased cooperative interaction could be incorporated into AD/Cycle.

Common library routines, such as changing, validation, versioning, and

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configuration control, will be supported by the ISPF/PDF library component, Software Configuration and Library Manager (SCLM). The *Gray Sheet* believes SCLM is the foundation for a future SAA common programming interface for library services.

IBM's fourth ADP service is a customer- or tool vendor-extensible IBM-supplied information model for defining the structures of formalized expressions such as data-flow diagrams, data definitions, source code, panel text, and other software objects. The information model should evolve to permit automated checking for software consistency, correctness and completeness, unambiguous communication between technical and business professionals, and continuous process verification.

The entity-relationship (E-R) constructs comprising the information model will be stored in the most significant component of the AD/Cycle ADP — the repository.

The Repository

The repository is a database application for centralized control and storage of shared application development information. As currently defined, it is not an active data dictionary for database management systems. It is a passive application development tool invoked by other tools.

IBM's implementation is constructed of three distinct mappings. The E-R model reflects the conceptual, or business, view of data. It includes data about business entities — such as organization, personnel, materials, machines, money, and information, as well as global policies associated with these entities developed during the enterprise modeling and planning and design phases.

Logical views of repository data are specific to individual tools. It is at this level that repository objects (tool-defined collections of elements) are managed and maintained. Also managed at the logical repository level are policies, sets of functions invoked when a tool operates on a given object.

The storage view of repository data is built on a layer of system-dependent database products. In the case of MVS, DB2 will be the repository engine; for VM, SQL/DS will provide the requisite functions; the integrated data manager of OS/400 will serve this role in the AS/400 environment.

This implementation is somewhat different from the ANSI Information Retrieval Dictionary Specification (IRDS). However, IBM is apparently committed to supporting the full IRDS specification as the repository evolves.

Generally speaking, the *Gray Sheet* believes that there will be close to a one-to-one mapping between E-R instances in the conceptual view and relational tables in the storage view. One application development object should correspond to at least a single row, but for complex objects, numerous records will be managed in concert.

The result is that large development projects will engender huge, highly complex repository databases. We look

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for IBM to regularly and significantly enhance the repository in the area of tuning and administration tools.

First Up: AD/Cycle-MVS

The first implementation of AD/Cycle is being delivered on MVS. The *Gray Sheet* believes that IBM is targeting approximately 200 large MVS customers as qualified candidates (neither too advanced, too far behind, nor too poor) for AD/Cycle immediately. Given its ambitious scope and the large resource requirements of the repository, large MVS users are IBM's only realistic target market near-term.

Four among the new products facilitating the delivery of AD/Cycle MVS deserve particular mention:

- Repository Manager/MVS (RM/MVS) 1.1, which incorporates the IBM-supplied information model.

- DB2 2.2 with additional optimizer enhancements improving performance in complex query environments, like AD/Cycle.

- Interactive System Productivity Facility/Program Development Facility (ISPF/PDF) 3.2, which provides for the OS/2 EE 1.2 Workstation Platform (WSP) component.

- Cross Systems Product (CSP) 3.3, which includes, among other things, an interactive External Source Format (ESF), support for long names, 8-10 major SQL extensions, and, for the first time, Batch generation options — all features critical to AD/Cycle.

The Repository Services CPI for SAA should be published 1Q90. At that time tool vendors and users may commence AD/Cycle tool development in earnest, but we suspect most will target the specific RM/MVS API, which should be fully published in June of 1990.

The integration within AD/Cycle-MVS occurs at the tools level, primarily through the ESF of IBM's strategic application generator, CSP, which MCPs at IBM have described as "the poor woman's repository." ESF is represented as a generalized markup language that identifies tags and attributes of CSP code objects. It is human readable and is editable by text editors.

To employ the AD/Cycle packaged tools currently being offered by IBM and ISVs, AD/Cycle-MVS for all practical purposes requires CSP. ESF is the main CASE-enabling technology of this implementation. It is through ESF that users will enforce version and change control; object validation will take place through the import/export utility of CSP, at import time. Until the Repository Manager/MVS API is fully published, users interested in getting a head start on AD/Cycle tool development should begin working with ESF.

In addition to the tools and programs being offered by IBM, Big Blue has recruited three of the CASE market's heavyweights (in name, anyway) to supply IBM with critical enterprise modeling, analysis/design, and maintenance tools. Index Technologies, KnowledgeWare, and Bachman will have their products marketed worldwide by IBM

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as part of AD/Cycle.

High-Level Implications

The AD/Cycle framework and IBM's initial MVS implementation has a number of important implications, some to cheer, others to jeer. First the cheers:

• AD/Cycle appears relatively open and user driven. IBM is committed to publishing the SAA repository services CPI, as well as fully specifying the API specific to the implementations on each relevant SAA platform. From an ever-expanding supply, users will be able to select and combine whichever methodologies and tools seem most appropriate for their development environment.

• AD/Cycle encourages independent tool development, process experimentation and refinement, and automation across the life cycle. We are encouraged by IBM's espoused reliance on business partners for essential information modeling and planning components. We are also encouraged by IBM's promise to publish specifications, principles, and guidelines so that users (and ISVs) can build (and market) their own AD/Cycle tools. IBM seems to be acknowledging that users are best positioned to construct their own application development environments, and that the larger the available pool of candidate tool technologies, the better will user requirements be served.

• AD/Cycle, at long last, validates the role of the workstation in SAA application development. However, it is critical to note that OS/2 EE 1.2 computers, regardless of the underlying microprocessor, are still 16-bit machines because OS/2 1.2 is a 16-bit operating system. To help protect tool upgradability to OS/2 2.0, which the *Gray Sheet* believes will provide for 32-bit addressing, customers and ISVs should perform tool development work in C.

• AD/Cycle is conceived with a forward-thinking view of software economics. Much commercial software R&D has been concerned with effecting incremental improvements in programming concepts, tools, algorithms, and languages. Most users' application development shops seem organized around coding skills. IBM's framework, in sharp contrast, seems geared towards implementing development environments organized with software quality, shortened turnaround times, increased complexity of function, user productivity — in short, business needs and people — in mind.

• IBM's development labs and corporate IS organization are standardizing on AD/Cycle. Apparently, Terry Lautenbach, general manager of IBM U.S., has laid down the AD/Cycle law. Its nice to see IBM is putting its alphabet soup where its mouth is.

And Now, a Few Jeers:

• AD/Cycle's extended rollout schedule. Repository Manager/MVS will be generally available in June of 1990. DevelopMate, IBM's business model prototyping tool, won't commence shipping until 4Q90. Numerous component interfaces, such as

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SCLM for library and perhaps ADPS for process management, are today half baked and subject to change. IBM's poorly defined server/requester strategy still constrains cooperation between programmable workstation and host. Finally, we are somewhat disappointed that tool integration will initially be at the tool-to-tool level, and not through the repository.

• How open is AD/Cycle? AD/Cycle is restricted to SAA, yet most environments are, or are rapidly becoming, multivendor. Furthermore, implementation choices will be constrained because the framework will likely not be delivered on powerful, low-cost, microprocessor-based "repository servers." (This is not a major criticism. The *Gray Sheet* suspects that even if they had the flexibility, for control and security reasons users might find it imprudent to load their corporate data jewels on a machine that could weigh less than 200 pounds.) Finally, IBM may well introduce its own version of tools that functionally "overlap" tools from independents. If this happens — and it probably will — IBM may be tempted to steer, however subtlly, the direction of AD/Cycle to improve the market position of its proprietary tools.

• AD/Cycle will initially severely disrupt most MIS development environments. Getting started on AD/Cycle is not so simple as buying a few OS/2 EE 1.2 workstations, loading them up with information planning and modeling tools, and playing with them during one's lunch hour. Users will need to dedicate significant resources to planning for the introduction of the AD/Cycle framework. No less than a technology transfer life cycle perspective may be required to ensure a smooth transition.

• Where's the AS/400? Users who have organized their development activities around AS/400's Program Development Manager are probably not holding their breath waiting for AD/Cycle on their treasured machines. Nevertheless, as further validation of IBM's commitment to the concepts of AD/Cycle, we await further AS/400 rollout information.

Conclusion

IBM's Programming Systems Division, the group within IBM responsible for delivering SAA, has descended from the mount after rapping with the eternal forces of application development. For the time being they have little more than tablets to display. However, computer industry participants should resist the temptation to discount IBM's AD/Cycle message. For inscribed upon those tablets are doctrines of application development that the *Gray Sheet* believes will influence MIS and end-user behavior profoundly in the 1990s and beyond.

It is still too early to grade AD/Cycle on anything but a pass/fail scale. We await future information on specific strategic SAA implementations and ongoing indications of IBM's benevolence towards the independent tools community. However, based on our understanding of the framework and IBM's position in the computer industry, AD/Cycle passes the *Gray Sheet's* initial inspection.

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Digital to Make Its CASE

With Terry Shannon, IDC's DEC Advisory Service

Not to be outdone, Digital will make a major CASE announcement, possibly on Tuesday, October 3, according to IDC's DEC Advisory Service.

The ***Gray Sheet*** believes the announcement will stress seven areas:

- Architectural standards. DEC's CASE strategy will extend the company's Network Application Services strategy to include application development. DEC will make the most of the fact that, in addition to VAXs running VMS and Ultrix, Apple Macs and (at least partially) IBM mainframes can be covered by the NAS umbrella. At the announcement VMS will receive the most attention, but DEC will stress the ultimate inclusion of Ultrix within its strategy.

- Distributed repository services. Digital has already positioned its distributable data dictionary offering, CDD/Plus, as an active repository product (active in the sense that it acts as a run-time control point for data). The ***Gray Sheet*** believes DEC will publish a collection of interfaces, based on Atherton Technology's Software Backplane product, called ATIS (A Tools Integration Standard). DEC will propose ATIS as an industry standard for repository services.

- CASE Integration Framework. DEC has its own way of organizing the concepts found in AD/Cycle.

- Presentation Integration. DECwindows will act as the foundation for common tool access.

- Data and Control Integration. To provide for cross tool and cross life cycle data sharing and coordination, DEC will supply common interfaces to its repository product, CDD/Plus.

- New complementary marketing partners (CMPs) for CASE. The most impressive new CMP will be Arthur Anderson which is committing to deliver certain host-based components of Foundation on the VAX.

- Education and consulting. Consultant Roger Pressman figures prominently in DEC's CASE Curriculum.

In addition, DEC is expected to announce its first strategic front-end modeling and analysis tool called DECdesign and enhancements to VAX DATATRIEVE (support for DECwindows).

Overall, the ***Gray Sheet*** believes Digital's technical challenge is not so great as is IBM's. Many of Digital's tools, like ACMS (its nonprocedural transaction monitor package) and Rdb (its relational database), are already constructed to exploit CDD/Plus.

However, its marketing challenge is monumental in comparison. Digital will have a very difficult time convincing customers to dedicate strategic development work to distributed VAXs.

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REPORT

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The Pacific Rim Is Going Online

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During most of the computer industry's history the Pacific Rim has been regarded as consisting of Japan and "Other." More often than not, overviews of the worldwide information technology industry lumped the non-Japanese Asian market into the ever-popular "rest-of-world" category.

A recent IDC study of the Pacific Rim's computer marketplace, however, unveils market opportunities beyond the standard ROW attitudes. Continuing economic expansion and an apparent ongoing willingness to invest in information technology regionwide places the Pacific Rim at the forefront among the world's regional growth rates.

Most of the computer markets of the Pacific Rim are today still embryonic, being both small in dollars and easily influenced by subtle changes in conditions. Moreover, various cultural differences can still be larger impediments to U.S. vendors' marketing strategies than the vast Pacific itself, like the willingness to "borrow" software. And, of course, questions concerning political stability, which may have been abating, are receiving increased attention in the aftermath of the Tienneman Square massacre.

But nonetheless, reports from IDC's offices in Australia, Hong Kong, Japan, Korea, Malaysia, the People's Republic of China (PRC), Singapore, Taiwan, and Thailand speak of significant developments that could begin mapping into sales. Consider the following:

- The economy of the Pacific Rim region is the fastest growing in the world today. The rate of economic growth in the area averaged over 8% in 1988. While rates are expected to slow through the 1990s, growth rates across Asia/Pacific will continue to exceed those of Europe and North America.

- In each country the market for computers is growing significantly faster than gross domestic product (GDP). IDC foresees this trend continuing for at least the next five years.

- Almost 2.3 million PCs were shipped to the region in 1988. As a result, the installed base rose to nearly 11 million personal computers regionwide by the end of the year.

- Thanks to the Japanese's predilection for mainframes, the region's multiuser business is thriving. Multiuser systems accounted for 75% of

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the total shipment value to the Pacific Rim.

From the standpoint of units and value shipped, Japan remains the largest single computer market in the Pacific Rim. Australia, the second largest, generates 10% of the region's sales revenue, far less than Japan's 83%.

However, the region's highest growth rates through 1993 are expected to be recorded by Korea and Taiwan (each at 20-35%), followed by Thailand (15-25%) and Hong Kong (10-20%). Whether the Pacific Rim countries realize higher or lower rates of expansion is very much a function of numerous factors, some indigenous to the computer industry, some exogenous.

The Mysteries of the East

Computer industry growth in the nations of the Pacific Rim, and the opportunities for non-Asian computer vendors, are likely to be most impacted by six factors. They are:

• Social unrest. Investment decisions in the region are becoming less dominated by concerns over the protection of life, limb, and property, but the safety of employees and assets is still an issue in some countries. Uncertainties about social stability are most accutely felt in the PRC, after the recent conservative backlash, and Hong Kong, which is slated to come under the PRC's dominion in 1997. It will be interesting to observe how IT affects political freedom in the area.

• Worldwide economic conditions. Historically, the economies of the Pacific Rim have been oriented towards exporting goods. Only a fraction of any given domestic market, both business and personal, had money to spend. Moreover, even if money was available, the populations in the region have displayed a bias towards saving and not buying. As a result, the Pacific Rim has minimal isolation from downturns in the world economy than most regions, for domestic demand hasn't been able to pick up the slack.

Recent ascensions of middle classes and middle class values will temper the effects of exogenous economic conditions. Nevertheless, a worldwide recession may lead to increased restraint in domestic spending, and IT investing, among these nations.

• Trade policies. The Pacific Rim countries are both nationalistic and, with the possible exception of Australia, oriented towards large-scale economic planning. Trade policy is structured to encourage development of industries considered strategic. Following Japan's lead, most of the region has targeted the IT industries as crucial to long-term economic development. Many significant governmental barriers to entering domestic IT markets are already in place; more may be erected.

• Physical infrastructures. To maintain acceptable levels of availability, computers usually require minimum environmental conditions, like clean power, air conditioning (for

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larger systems), and access to a stable telecommunications plant. Many of these nations are not yet able to economically supply some of the physical resources required to support computer systems.

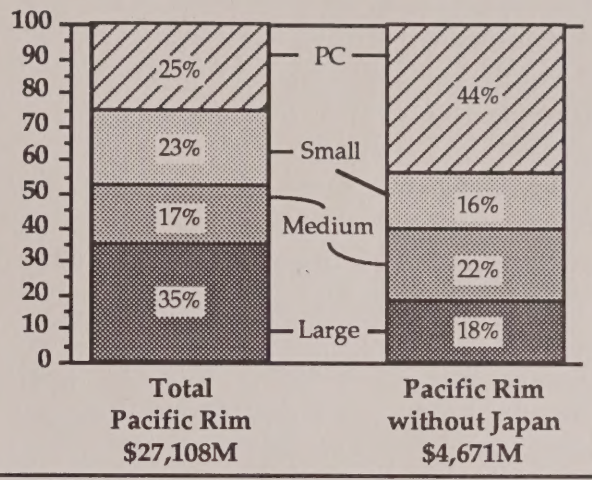
• Organizational infrastructures. Low literacy rates and an inadequate supply of technical expertise, as well as poor familiarity with computers, present most Pacific Rim nations with steep IT learning curves. Knowledge of applying, operating, managing, and servicing computer systems is not widespread. Moreover, without an adaquate physical infrastructure, large-scale coordination of these activities is costly and prone to breaking down. Introducing and supporting computers and computer-related technologies is therefore problematic in much of the Pacific Rim.

• Availability of language- and culture-specific technologies. Providing applications with national language support in the Pacific Rim requires more than just well-structured programs built with parser generators and message databases. Incorporating Kanji or Mandarin support, for example, into computer offerings can demand highly-specialized keyboards, monitors, printers, and other peripherals. Programs must be written to handle double-byte character input/output. Many hardware and software companies have not yet adjusted their product and program portfolios to meet these requirements.

Each of these factors, of course, will be in force to different degrees across the region.

Pacific Rim 1988 Shipment Value by System Size Class

(Source: International Data Corporation, 1989)



Australia

Due in large part to the fact that Australia's demographic, cultural, and political profile is the Orient's most Westernlike, the most mature computer market in the Pacific Rim may be down under. Australia, of course, speaks English, the language of high tech, has a literacy rate of 99%, and has the largest percentage of white collar workers in the region. By the end of 1988, the Aussies had installed more dollars per capita of computer-related equipment — nearly $725 — than any other Pacific Rim nation.

IDC expects that the Australian computer market will begin to deaccelerate, dropping from a torrid 30+% per annum during much of this decade, to 10-15% annually through 1993. Growth in multiuser systems, bolstered by the growing acceptance of Unix and continuing strong demand for large-scale systems, will remain robust relative to the rest of the world. On the other hand, the market for PCs

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has begun a significant decline from the breakneck growth rates of the early-to-mid 1980s. IDC expects PC unit shipments will grow about 13% per year through 1993.

Hong Kong

The factor dominating change in Hong Kong, whether associated with the information technology industry or otherwise, is the 1997 transition of control from the UK to the PRC. Although the PRC states that most of Hong Kong's existing social institutions will remain in force, a major exodus of professional talent is underway. We can expect Hong Kong's emigration problem to get worse as 1997 draws closer.

Uncertain about the future, many of Hong Kong's citizens and businesses are speculating on short-term gains instead of investing in long-term projects for enhancing national competitiveness — such as foundations for information processing. Thus, it is unlikely that the Hong Kong market will continue to grow at the same 25-40% rates recently experienced.

Upgrade business in Hong Kong's important financial market will drive large-scale shipments up about 10% per year over the next four years. During the same time period IDC expects medium-scale shipments will be boosted by about 15% per year; the anticipated successes of IBM's AS/400 and Digital's VAX line will contribute to this growth. Small systems and PCs should both enjoy around 15% growth through 1993.

Japan

In addition to being by far the largest consumer of computers in Asia — nearly $80 billion worth of computers and related equipment is installed on the island — Japan has acted as a catalyst in IT markets throughout the Pacific Rim. To supply a world hungry for Japanese products, Japanese companies have built manufacturing capacity in other Asian nations, exporting computer systems expertise in the process.

At home, Japan is second only to Australia among Pacific Rim nations in the value of systems installed per capita category. However, a disproportionately large (relative not only to Asia, but also the world) percentage of Japan's installed computer equipment is mainframes (see the ***Gray Sheet***, 24:13, 16 December 1989. Whereas the U.S. has one PC for every five people, and Australia has one PC for every seven, Japan has one PC for every 18 individuals. This is presumably due to a Japanese bias for centralized management of information systems and the lack of a unifying PC standard (see the ***Gray Sheet***, 24:17-18, 13 February 1989).

IDC believes that the mainframe market will continue to generate about 40% of the Japanese shipment value through 1993. However, while larger mainframe and medium-sized systems should grow at about 8% per annum during that time, the value of small- and PC-scale systems shipped should grow between 15-20% per year.

Korea

The Pacific Rim's strongest economic

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Selected Pacific Rim Computer Industry Demographics

(Source: International Data Corporation, 1989)

	YE'89 est. Pop. (K)	White-Collar Work Force (%)	Literacy Rate	Installed PCs (YE88 units)	Value of Total Installed Base ($M, YE88)	People per PC	Installed Base Value per capita
Australia	16,090	46%	99%	2,250,000	11,612	7	$722
Hong Kong	5,450	39%	N/A	100,000	801	55	$147
Japan	123,231	39%	99%	7,007,716	79,556	18	$646
Korea	45,243	30%	92%	220,000	1,740	206	$38
Malaysia	16,901	20%	80%	57,200	439	295	$26
PRC	1,069,628	12%	70%	334,600	4,160	3,197	$4
Singapore	2,668	43%	85%	86,000	647	31	$242
Taiwan	20,283	28%	90%	575,000	2,384	35	$118
Thailand	55,017	18%	89%	65,000	427	846	$8
Total	**1,354,511**	**16%**	**75%**	**10,695,516**	**101,765**	**127**	**$75**
w/o Japan	1,231,280	14%	72%	3,687,800	22,209	334	$18
w/o China	284,883	32%	92%	10,360,916	97,605	27	$343
U.S.	247,498	54%	99%	45,484,000	285,408	5	$1,153

growth and firmly established government policies for promoting information technology industries have produced significant growth on both the supply and demand sides of the Korean IT market.

When compared with the larger markets of Japan and Australia, IT penetration in Korea is hardly impressive: one PC for every 206 people; $38 worth of installed equipment per capita. But considering Korea's 12%+ annual GNP growth the past few years and the growing power of its middle class, IDC believes Korea is emerging as a major Pacific Rim market.

PC unit shipment growth of between 40-50% a year is expected to hold through 1993. Large-scale systems will experience the second highest rate of growth, nearly 30% per year. Midrange growth will lag somewhat in the 15-18% growth range.

Malaysia

Malaysia's attractiveness as a lower-cost alternative to Taiwan and Korea is partially offset by recurring political tension stemming from Prime Minister Mahathir's efforts to retain control. However, Mahathir's manipulation of the country's laws and economic system seem to be producing "better than expected" results. IDC analysts in the region, believing the environment to be stable enough for business planning, anticipate increased IT investments in the country.

Malaysia's market faces some significant barriers to growth: its literacy rate is among the region's lowest; a relatively small percentage of its population is employed in white-collar roles; and its poor physical infrastructure, including telephone lines and roads, makes communication and computer system service problematic.

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Given the difficulties of communication, IDC expects the Malaysian computer market to emphasize personal computing. Starting from a small base of $439 million worth of computer equipment installed, IDC expects shipments to Malaysian computer consumers to grow at a rate of between 15-20% for the next four years.

People's Republic of China

In absolute terms, the PRC is the Pacific Rim's third largest market; excluding Japan, 19% of the Pacific Rim's systems value is installed in China. However, if its market is considered in terms of population, the PRC is by far the least well-developed market in Asia. There is only one PC installed for about every 3,200 people; measured another way, China has only $4 of computer equipment installed per capita.

A major reason for the PRC's relative market immaturity is a national political agenda that discourages any reliance on foreign imports, instead stressing "invented here" initiatives or the development of joint ventures with outside vendors of goods and services. Seduced by the potential of servicing a nation of nearly 1.1 billion, firms like Digital are already manufacturing key products locally, such as the MicroVAX 2 and 3; IBM has been negotiating with China to manufacture PS/2s on the mainland — or at least was prior to the recent crackdown.

Only in the high-end of the computer market spectrum are users encouraged to buy foreign outright. In the other markets, IDC does not believe that China's productive capacity will support huge volumes of growth in computer purchases.

Partially in response to constraints on supply, a substantial gray market for personal computers has emerged. IDC estimates that the gray market may account for as much as 10% of the Chinese PC market. As demand for PCs increases, this figure may rise to as much as one-third of all PC shipments.

Singapore

Primary determinants of computer market growth in Singapore are vendors' abilities to support and service their wares. Assuming the supply side of the market is able to improve after-sales effectiveness, IDC expects the Singapore market to begin a significant swing away from purchases of larger systems by large institutions (Singapore's government accounts for 65% of the market) towards a wider base of buyers purchasing small- and PC-sized systems.

Unit shipments of large- and medium-scale systems are expected to grow about 10% per annum to 1998. Small-scale systems growth is expected to exceed 10% and PCs shipments should grow nearly 20% per year during the same period.

Taiwan

Like Korea, Taiwan currently is heavily oriented towards exporting. The country has emerged as a key manufacturing center for low-end systems. Taiwan companies have recently played host to various U.S. industry

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bigwigs, including Microsoft's Bill Gates and Sun's Scott McNealy, interested in swaying Taiwanese support for one PC platform or another.

Also like Korea, Taiwan's strong economy is fueling computer expenditures. Although government estimates indicated the country's economy was markedly slower in 1988 (appr. 7%) than 1987 (appr. 12%), IDC anticipates Taiwan's GNP should average about 7% growth per year for the foreseeable future — strong enough to drive unit shipment growth across all size classes up between 20-35% per annum through 1993.

Somewhat surprisingly, shipment growth in the medium-scale segment has been particularly brisk — 52% in 1988. IDC expects the market for medium-scale systems to slow down to about 20%, just above the anticipated rate of growth for mainframes (15%). More impressive unit shipment growth — about 25% per year — should be registered in the small-scale systems market.

As more business and individuals invest in personal computing, IDC suspects that the Taiwanese PC market should grow at about 20% per year. This should also help protect Taiwan's export-oriented manufacturers from the vagaries of demand in worldwide markets.

Thailand

First-time buyers and smaller-scale upgrade business dominate Thailand's small computer market. In a still booming economy (preliminary government figures claim Thailand GNP grew 10.4% in 1988), many business are either buying IT for the first time or scaling their applications portfolios from PCs to small-scale to medium-scale systems. The country still has almost no large-scale systems installed. Indeed, you could count Thailand's 17 large-scale systems installed on four hands.

IDC believes that Thailand's political structure is stabilizing and will be capable of supporting 15-25% growth in its computer market. First-time buying and "upsizing" will continue to account for most of Thailand's market activity.

Conclusion

The U.S., with a population of nearly 250 million, has about 45.5 million PCs installed — one PC for every five people. Moreover, at the end of 1988, more than $285 billion worth of computer equipment was installed in the U.S., about $1,150 per person. Contrast these figures with the totals for the Pacific Rim: one PC for every 127 folk; $75 installed per capita.

As more of the world's business is conducted using computers, and a larger percentage of market value created using information technology, the Pacific Rim will feel increasing pressure to improve its computer expertise and expand its computer capacity. Japan is expected to continue playing a leadership role in the region, helping to introduce computer expertise and products into the area's local economies.

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WORKSTATION IMPLOSION. Apparently concerned that the "graphics workstation" business was not destined to develop as originally hoped, East Coast Stellar Computer and West Coast Ardent have decided to combine forces. The result, Stardent, will be formed by a pooling of interests. Kubota Ltd. of Japan, Ardent's largest investor, will control 22% of the new entity and, over time, emerge as sole manufacturing source for Stardent products. The executive team will be drawn equally from the ranks of the two companies. Bill Poduska, Stellar top dog, and Allen Michels, head honcho at Ardent, will share CEO and chairman responsibilities for the next 30-90 days. Then, one of the two will be named CEO and the other chairman. The CEO's location will determine the placement of headquarters.

RISCY BUSINESS. Presumably following Sun's lead, Hewlett-Packard has opted to license its RISC Precision Architecture (HP-PA) to two Far East electronics giants. The first, Japan-based Hitachi, will join HP in codeveloping a new, higher-speed version of PA. Both companies plan to manufacture the Hitachi implementation under their own brand names. Each also announced intentions to provide system software that complies to OSF specifications. HP has licensed both HP-PA and its advanced submicron CMOS process technology to its second RISC partner, Korea-based Samsung. The two will codevelop over the next two years, and Samsung will ultimately manufacture, highly integrated chip sets targeting the lower end of the market; both companies may market the result. As with Hitachi, this effort is expected to be equipped with OSF-compliant system software.

In another part of the world, N.V. Philips, the massive electronics firm of the Netherlands, announced it is licensing Sun's SPARC for use in embedded controllers. Although embedded controllers don't have as high a profile as, say, workstations, INSTAT's RISC processor forecasts show embedded sales accounting for more than 60% of the RISC merchant market.

STANDARDS ACROSS THE OCEAN. They aren't the sexiest standards bodies around, but even if their agreement isn't flashy, it doesn't lack in overall importance. Perhaps anticipating possible 1992-related red tape, the folks empowered to affix those ubiquitous UL labels to every electrical gadget have reached an agreement with a major European peer for recognizing each other's seal of approval. Underwriters Laboratories (UL) and the British Standards Institution (BSI) will jointly provide a mechanism for either organization to evaluate a manufacturer's quality assurance system and to register the system with UL, BSI, or both UL and BSI to International Standards Organization 9000 Series Standards and European Norm (EN) 29000 Series Standards. The ISO and EN standards are intended to become the governing documents for evaluating QA systems throughout Europe.

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Computer Industry
REPORT

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HNSX Asks: Anyone in the U.S. Wanna Buy the World's Most Powerful Computer?

HNSX Computer, the joint supercomputer effort between NEC of Japan and Honeywell of the U.S., has found itself in the midst of an interesting dilemma. Its charter is to market a Japanese-bred machine (the SX-X, which some claim is the world's most powerful computer) to a nation (the U.S.) becoming increasingly sensitive to Japanese technology advances.

There is almost universal agreement that supercomputers are essential to maintaining and improving a nation's competitiveness. Powerful machines performing billions of floating point operations per second (GFLOPS, for gigaFLOPS) are capable of simulating product specifications before a company "bends metal." Research, development, and manufacturing activities benefit from lower costs, shortened time cycles, and higher quality decisions at all stages of a product's design process.

Who will supply the world with supercomputers is more open to question. Recently, NEC and Fujitsu have announced machines that rival if not exceed the performance of Cray Research's best effort to date. On a price/performance basis, the most attractive supercomputers herald from Japanese vendors.

But because many believe that the competitiveness of a country's supercomputer industry may become a determinant of the country's overall worldwide competitive standing, the ramifications of allowing the Japanese

HNSX Computers at a Glance

Founded: 1987

Headquarters: Billerica, MA.

Parents: 50% owned by NEC Corp. of Japan ($22 billion annual sales); 50% owned by Honeywell of the U.S. ($7 billion annual sales).

Three part mission: (1) development of market and product requirements for North American government, commercial and academic supercomputer markets; (2) applications development and porting; (3) sales and support of NEC supercomputer products in North America.

Number of Employees: 50 total (42 HNSX staff; 8 NEC staff on HNSX's payroll).

Funding: approximately $20 million initially; $15 million per year thereafter.

a toe-hold in the U.S. supercomputer market is a hot topic of debate.

There are two reasons for concern. First, technical advances at the supercomputer level may ultimately drive the commercial state-of-the-art at the MIS end of the computer industry spectrum. Some believe that should the U.S. withdraw from the high end of the computer industry, a loss of leadership in other areas is just a matter of time.

Second, as information technology becomes more important in all industries, many maintain that the country dominating IT markets will necessarily gain tremendous cost and experience advantages in all important industries.

This second point may be especially true in the area of supercomputers. Because supercomputers are central to emerging industrial design processes, a country in the position to dictate the pace at which new supercomputer technology is transferred worldwide may also be in position to influence the pace of innovation in other domains.

Juxtapose the remarkable strides made by Japanese supercomputer firms with recent decisions by Control Data to shut down its ETA supercomputer subsidiary and Cray Research to spin out founder Seymour Cray's GaAs project under a separate Cray Computer cover. The resultant profile of the U.S. supercomputer industry's competitiveness is not pretty. Consider the following:

- Building competitive supercomputers today appears to be a relatively capital-intensive undertaking; CDC claims ETA was costing it $100 million a year. Japanese firms have greater access to cheaper sources of capital than do American companies. Most Japanese vendors acquire capital through debt markets; U.S. firms must rely more heavily on expensive equity markets for capital.

- The highly-integrated nature of Japanese companies presents firms like NEC, Fujitsu, and Hitachi with significant opportunities to cross-subsidize supercomputer activities.

- Japan's leadership in semiconductor technology is generating tremendous paybacks in its supercomputer efforts. U.S. firms appear intent on countering this advantage by pursuing parallelizing system software technologies. But the simple fact is: hardware reliability is still easier to test and verify than software reliability. For the intermediate future, price/performance improvements are more likely to flow from advances in hardware than software technologies.

- By some estimates, Japan has installed approximately three times as much supercomputer power per academic as has the United States. This means that Japanese students are better trained in supercomputer use. Not only is the U.S. in danger of los-

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ing its technological edge, but its leadership in how to apply supercomputers is at risk as well.

- Effectively, there is still a schism between supercomputers and mainframes in the minds of most U.S. vendors and users. As both users and vendors, the Japanese appear to have done a better job of transferring technologies between the technical and commercial worlds than have their American counterparts. Therefore, returns on supercomputer investments are probably accrued faster, and may be larger in Japanese user and vendor firms.

Generally speaking, U.S. vendors hold two decided advantages over foreign competitors in the U.S. supercomputer market. The first is a much larger installed base and portfolio of available software tools and applications.

Given comparable price/performance, supercomputer buying decisions appear to be driven by the much the same factors driving most computer purchases: are there folks around who can make it operate smoothly and fix if it doesn't, and does it run the purchaser's favorite software package.

The second advantage has less to do with past successes, namely, that U.S. supercomputer vendors can paint themselves red, white, and blue.

Not only have important people expressed concerns about relying on foreigners for the highest of high tech products, but the supercomputer issue has become a matter of national pride. In many respects, the primary driving force behind nascent supercomputer trade legislation is that politicos and press pundits don't like the idea that the most powerful computer in the world may originate in Japan.

A Very Big, Very Hot Box . . .

In the case of HNSX, success may ultimately hinge on whether or not the marketplace is willing to accept it as, at least in part, a U.S. firm.

From a technical and performance standpoint, the SX-X is a very impressive machine — certainly impressive enough to sell well. The machine can be configured with up to four arithmetic processor units (APs), each supported by up to four vector-pipeline sets, capable of providing a reported 5.5GFLOPS for a total of 22GFLOPS. From a scalar performance standpoint, individual APs can

Worldwide Installations and Availability of Applications Software Packages for Leading Supercomputer Vendors, Year-End 1988

(Source: International Data Corp., 1989)

Company	Country	Installed Base	Number of Applications
Cray	USA	235	500+
Fujitsu	Japan	74	260
NEC	Japan	16	180
Hitachi	Japan	12	120

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perform 170MFLOPS; a four AP system can generate up to 680MFLOPS.

Such performance specs are made possible by state-of-the-art chip packaging techniques. On each multichip package (MCP), 100 VLSI logic and memory chips can be mounted on an eight-layer polyimide substrate. Each logic chip has a density of 20,000 gates with a switching speed of 70 picoseconds. In total, an MCP packs 2 million gates into an area of less than 80 square inches.

NEC combined the machine's component technology (it's known as the SX-3 elsewhere) with impressive system specifications — a 2.9ns system clock, up to 2GB of main memory (utilizing 20ns 256Kbit Bi-CMOS static RAMs), an outboard semiconductor disk (SSD) of up to 16GB in size, and an aggregate I/O capacity of 1GB/sec. There will always be disagreement about real-world workload performance, but the SX-X appears to sport a system balance necessary to turn performance specs into real work.

Super-UX, the Unix-based control program for the SX-X, supports Unix System V and incorporates numerous Berkeley 4.3 extensions. An Advanced Scientific Library for the SX (ASL/SX) is comprised of a large number of mathematical subroutines specifically optimized for the SX-X machine architecture.

The price of the high-end machine, the SX-X44 at $24.5 million, is also competitive with other monster supercomputers.

About the only two glaring product weaknesses of the SX-X in today's market are: it won't be generally available until 3Q90; and data on the outboard SSD can be lost in the event of a significant power disruption.

. . . From Two Heavyweights

HNSX sports an impressive lineage, one that should convince the market of its stability. HNSX's two parents, NEC and Honeywell, have enjoyed a 25-year technical relationship. NEC's total worldwide annual sales exceed $22 billion; Honeywell is a $7 billion company. Both own a 50% stake in HNSX. Various covenants prohibit each from selling their shares without first receiving permission from the other.

However, the fact that HNSX's U.S. employees are chiefly involved in marketing the SX-X, and not manufacturing or designing it, creates problems for the company. Although the firm's headquarters are here in Massachusetts, the market will probably behave towards HNSX as though it were a Japanese firm.

The Visible Hand

That means that any protectionist legislation related to supercomputers probably won't offer any relief to HNSX. In recent conversations with the *Gray Sheet*, HNSX executives have acknowledged their awkward position.

Their company's strategy is, first, to fight the linking in the public mind between supercomputer design and manufacturing sites and overall competi-

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tiveness, and second, to install as many machines, port as much software, and train as many users as it can in the shortest time possible.

Chances are that HNSX will be largely unsuccessful on the first score. Concerned about recent U.S. supercomputer stumbles, powerful proponents like Senator Albert Gore of Tennessee are stumping for a national supercomputer initiative combining protectionist trade legislation and strategic use of the federal government's buying power to bolster U.S. competitiveness.

Some are calling for the creation of a civilian panel charged with drafting and coordinating a U.S. supercomputer policy. Others want the government to spend $1.75 billion building by 1995 a national supercomputer "data highway" to link remote installations with a fiber-optic computer network.

Whatever the actual legislative outcome may be, the U.S. marketplace will likely be swept in the near-term by a "buy American" attitude that could effectively, if not legally, preclude a significant Japanese position. As one HNSX prospect reportedly quipped: "I'm ready to kill for one of these machines, but I'm not ready to die for it."

Never Tell Them the Odds

The possibility of explicit or implicit U.S. reprisals against Japan supercomputer vendors is tempered by the fact that U.S. buyers really have very few indigenous suppliers of these machines. The leader, Cray Research, has little competition in its class.

Users desperate for second sources, either because they want leverage in their negotiations with Cray or their demand for supercomputer power exceeds Cray's ability to supply it, may be wooed to invest in Japanese technology.

At least, that's what HNSX hopes. In the near term HNSX will target the academic communities for opportunities. In their sales efforts on college campuses, the company will have to negotiate a thin line between offering educational discounts and "dumping."

This will be no small feat. Cray, in particular, has a much larger library of packaged software available for use — over 500 applications. Although many users develop their own proprietary code, the widespread availability of proven mathematical libraries and other commercial-grade programs lowers the total opportunity cost of buying Cray. HNSX must counter this advantage by significantly undercutting Cray's price/performance.

And also it must aggressively port software to the SX-X. To date HNSX claims to have more than 250 applications now running on Super-UX; IDC estimates that as of year-end 1988 only 180 titles were available, leading the ***Gray Sheet*** to guess that as much as 35% of the HNSX software base may have been ported in the last seven months. The firm has established a porting center at the Houston Area Research Center (HARC) to assist software developers looking to convert code. Further centers may be opened should the demand arise.

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What's This in the Glass House?

HNSX is confident that its strategy will succeed because it believes in a gradual convergence of supercomputers and commercial general-purpose mainframes. It anticipates that in the next five years supercomputers will begin penetrating traditional glass house accounts in significant numbers.

Although in Japan this convergence appears to be under way, the fact is that most supercomputers in the states are run in batch mode — even if they're on a network. Setting up jobs in these highly optimized machines requires a lot of machine time. In the view of some, the overhead of switching between multiple tasks prohibits general-purposelike workloads.

(Cray Research, for instance, does not offer, nor does it expect to offer, virtual memory on its highest-end processors. It believes demand-paging exacts too high a performance cost.)

It seems more likely that early crossover accounts are buying general-purpose machines, like the IBM 3090, fitted with vector accelerators. That way such accounts have access to not only large portfolios of technical applications, but all the business applications software available for these machines.

Assuming the demand for massive technical and commercial servers connected to enterprisewide networks increases, HNSX may find the crossover market receptive to its wares. However, even if Cray never supplies the multiprocessing functions necessary to compete in this potential market, HNSX will regularly confront the likes of IBM, Amdahl/Fujitsu, Hitachi/NAS, and minisupercomputer upstarts like Convex.

The Bottom Line for HNSX

Given the political and market challenges facing HNSX, its forecasted target of selling 15-20 machines over the next five years seems ambitious. NEC has been capable of selling only one supercomputer to a U.S. customer in four years; the lone success is running at HARC. HNSX has sold goose eggs.

The centerpiece of the company's marketing pitch is the absolute performance difference between the SX-X and Cray Research's current top machine, the Y-MP. HNSX claims the SX-X is eight times as powerful as the Y-MP.

Many would question whether the 8X figure would hold up under real-world conditions; Cray's design is generally thought to remain superior because it is optimized specifically for supercomputing. However, whatever HNSX's actual performance advantage, the next-generation machines from both Cray Research and Seymour Cray's Cray Computer will take a big bite out of the difference.

IDC's Technical Computing Program (TCP) estimates that Cray Research will bump its high-end performance specs by about three times (to approximately 8GFLOPS) when it introduces the long-awaited C-90. Furthermore, IDC's TCP believes that the gallium arsenide-based computer in

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Expected Timetable for Cray Research and Cray Computer Products

(Source: International Data Corporation, 1989)

	Cray Research	Cray Computer
Product	C-90	Cray-3
Technology	silicon	gallium arsenide
Expected introducion date	1991	mid-1990
Expected shipment date	1992	1991
Expected peak performance*	8,000MFLOPS	16,000MFLOPS
Expected price range	$16-25 million	$25-30 million

*Peak performance figures are based on theoretical 16-CPU configurations. Please note that actual performance results will be dependent on actual configurations.

Seymour Cray's head and Cray Computer's lab will deliver about 16GFLOPS when finally delivered.

Both of these machines are expected to commence shipping by early 1992, not much time for HNSX to establish itself. At that time, the C-90 will offer software compatibility with Cray Research's existing installed base, a fact very difficult to sell against. Cray Computer will be attempting to enter the market, as is HNSX, but it has the decided advantage of being American, and springing forth from the mind of the legend himself.

The other factor to be considered is IBM. Three months after Steve Chen's September 1987 departure from Cray Research, IBM agreed to fund the design wizard's start-up, Supercomputer Systems. It is still too early to speculate as to what the combination of Chen's technological genius and IBM's business savvy will produce, but it seems safe to assume that it won't make HNSX's mission any easier.

The Bottom Line on U.S. SCPUing

If the U.S. is to retain its leadership position in the supercomputer market, it must avoid the temptation to quick-fix competitive problems with overly protectionist legislation. Nor can we simply expect that IBM's entrance into the market will ensure a strong U.S. presence.

Instead, what is necessary is a holistic perspective on supercomputer competition that addresses equally any semiconductor shortcomings, financing challenges, and educational dilemmas we face. It doesn't help the U.S.'s position, for instance, if we set import quotas on machines but have to import large numbers of supercomputer programmers and operators.

Certainly, the U.S. supercomputer industry must be supported. However, in taking actions to encourage its development, we shouldn't forget that it is competition, and not protection, that seems to encourage excellence in a market.

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MCA GOES COMPAQ'S WAY. In a stunning reversal, Compaq, the leader of the BRAT Pack (see the *Gray Sheet*, 24:7, 9/29/88), has licensed the Micro Channel Architecture from IBM. Although Compaq at the same time denied any MCA product plans, this seems to be a case of acknowledgement equating to surrender. It seems difficult to believe that EISA ranks will remain in line with the captain hedging its bets. No financial terms were disclosed, but a Compaq spokesman maintains the deal will have no material effect on earnings.

EDS BOARDS CLIPPER. About five months ago, EDS entered into a formal agreement with Hitachi to purchase NAS (see the *Gray Sheet*, 24:20, 3/27/89). After being pressured by Intergraph, who was looking for a prestigious customer reference, General Motor's systems integration division has announced it intends to use Intergraph's Clipper RISC architecture as the foundation of a multiprocessor RDBMS machine. Few details are available at this date, but an Intergraph spokesperson contends EDS plans to use the machine within GM as an 8-way channel-attached database accelerator capable of generating about 110MIPS.

When the Hitachi/EDS/NAS deal was announced, the *Gray Sheet* suspected that EDS's database expertise might find its way into product. We did not, however, anticipate that this product might have nothing to do with NAS/Hitachi. It appears that the Clipper project has been underway since before the Hitachi deal, but the fact that EDS did not go with its partner's database mac[illegible] technology is interesting.

SOVIETS TO GET PC/ATs. The Department of Defense isn't happy about it, but Commerce has moved to decontrol general desktop machines with a data processing rate of 68 million bits/second — bureaucrat-speak for a 16MHz 80286 or equivalent — and configured with up to 4MB of main memory and 140MB of external disk storage. Commerce says the move was warranted because the Soviets had access to the machines through channels separate from the Coordinating Committee on Multinational Export Controls. The DOD insists the U.S.S.R. is gaining access to this level of high-performance computer technology for essentially the first time. Certainly, CAD/CAE/CAM programs on 16-bit ATs is far superior to that available on 8-bit 8088/8086 class machines.

SUNWATCH: SUNDOWN. A detailed financial report for the June 30 fiscal quarter and year won't be available until late August, but Sun has clarified its muddy earnings picture. The company expects to report a loss of approximately $25 million on revenues in the range of $425-435 million. Although no extraordinary year-end write-offs or inventory adjustments are expected, it seems clear that inventory management problems, related to product mix shifts and difficulties with a new mainframe computer system, are the culprit. The company also advised that the current quarter may not be profitable either.

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THE GRAY SHEET
Computer Industry REPORT

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The greatest industry force witnessed in the *Gray Sheet's* 25-year history:

Open Systems

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In twenty-five years of assessing the information technology (IT) industry the *Gray Sheet* has beheld numerous trends, fads, so-whats, sure-things, and wholly-unexpecteds. A hundred seasons have passed, and it seems that with each one an IT dominion somewhere is being erected or crushed.

IDC 25 YEARS
ANSWERS FOR THE INFORMATION AGE

Few, perhaps none, of the developments witnessed by the *Gray Sheet*, however, have the long-term consequences of the trend towards open information systems.

Change in the industry has always been extraordinarily fast, but has generally proceeded along similar lines that became familiar to both vendors and users. The predominant five-to-seven-year selling and buying cycles called for upgrading applications to exploit new machines with faster CPUs, cheaper memory, better mass storage, and improved control programs.

As a result, for most of the *Gray Sheet's* history, market assumptions have been relatively straightforward, expectations relatively simple, and planning relatively easy on both the supply and the demand sides of the IT industry.

This open systems business is very different, not at all like previous periods of evolution, and is placing severe strains on the capabilities of all the market's participants to set strategy. New IT technologies and management techniques developed since the advent of personal computing are impelling organizations to reevaluate their fundamental IT premises and principals. Throughout the industry, a few questions are being vigorously debated:

- Why should we consider open systems?
- What role is open systems playing in the IT industry?
- Are Unix and open systems synonomous?
- Are open systems mainframes on the horizon?

As the 1980s draw to a close, organizations both here in the U.S. and in every nation around the globe have

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come to realize that revolutionary new technologies and ways of doing business critical to long-term competitive advantage are on the horizon. Institutions able to adapt rapidly will thrive; others mired in old ways, unless artificially bolstered by governments, will undergo entropy, atrophy, and eventually die.

Why Open Systems?

In a maturing world economy, differentiation and cost advantages are becoming more dependent on innovation in the processes employed to bring products and services to market than the products themselves. Strategies founded on getting customers the same old mousetrap when, where, and how they need it appear to be dominating strategies geared towards occasionally building better mousetraps.

IT has played a critical role in the strategic shift. Technologies like CAD/CAM/CAE are speeding design and manufacturing. New distribution schemes are possible thanks to online transaction processing (OLTP). Massive customer databases, easily accessible through relatively simple forms and query tools, are creating tremendous opportunities to stay abreast of customer requirements.

Most importantly, firms are partially substituting enterprisewide computer networks for the formal, bureaucratic routines traditionally employed to exercise control. The increased communication between processes and functions enables knowledge to flow more easily in organizations, pooling where needed almost instantaneously in response to time-critical tasks.

The trend to disperse DP resources, largely in the form of personal computers, has greatly benefited both the computer industry and IT-savvy customers. But have been accompanied by costs.

Like the corporations they support, IT professionals are discovering that successful MIS strategies focus on getting users more access, more service, more applications, and more performance. The resulting end-user networks have become remarkably complex and difficult to manage and control.

On the supply side, the incredible rewards to be gained from selling products to an ever-increasing army of power-hungry end users has caused hundreds of start-ups to enter the market and numerous existing players to retarget their competitive thrusts. The industry's tangle of strategic partnerships and market positionings severely hampers any one vendor's, including IBM's, capability to set industry directions.

The demands being placed on IT are not expected to abate in the near future. Over the next ten years, IDC expects new users to be added worldwide at a rate of nearly 30% per year, well above the growth in IT expenditures. Corporations will be forced to expand their information systems across national, language, market, and regulatory boundaries to defend advantages

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One Perspective on the Growth in Complexity of Systems: The IT User Explosion

(Source: International Data Corporation, 1989)

Period	Characteristic	Number of Direct Users Worldwide By End of Period
1944-1950	Pioneering Computer Development	3,000
1951-1957	Initial Commercial Systems	20,000
1958-1964	Spread of Large-Sized Systems	140,000
1965-1971	Spread of Medium-Sized Systems	1,000,000
1972-1978	Spread of Interactive Terminal-Based Systems	7,000,000
1979-1985	Dispersed DP via PCs	50,000,000
1986-1992	Integrated Enterprise IS Networks	350,000,000

won in simpler domains.

The existing market structure is probably unable to absorb this kind of growth. In an effort to build far more efficient systems, vendors and MIS are exploring new competitive, organizational, and technological forms that have come to be known collectively as open systems.

Open Systems in the IT Industry

Gather a few IT professionals together to talk about open systems and the conversation is likely to become dominated by either platitudes, pooh-poohing, panic, or punching, depending on the group's bias. Reactions to the subject are so different partly because no standard (pun intended) definition exists.

To many yeasayers, open systems are low-cost IT components that can be thrown together like erector sets until a perfectly functioning, easy-to-maintain information system emerges. To many naysaysers, open systems are little more than the sum of the open-this-and-open-that groups that have sprung up around the industry.

But open systems are much more than a purchasing agent's fondest dream, and are certainly much more than a press circus.

Building far more efficient systems will require far more productive technologies. Although, other things being equal, a low-cost tool is more productive than one costing more, cheap IT components aren't enough. The management and integrity problems of complex heterogeneous networks persist despite the rapid advances in processor price/performance.

Furthermore, as the computer industry matures, vendors are being forced to dismantle the switching barriers they've erected over the years.

(cont. p.6)

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What Are Open Systems?

(A Note from the editor: *Gray Sheet* readers are advised that this section contains considerable technobabble, although every attempt has been made to make it accessible. It can, however, be skipped without losing the flow of the rest of the piece.

Its purpose is to present, in as neutral a fashion as possible, a definition of open systems that could be used to assess industry events in terms of openness. One key area is the standardization of programming interfaces for database, communications, language, and end-user access.)

The efficiency of a system is enhanced by transferring more productive technologies into its operations. These technologies might consume fewer resources than the status quo, and/or they might embody technical advances that accomplish more work per unit of resource.

In a given operating environment, inefficient systems must either adapt new technologies, force other systems to undertake adjustments, or ultimately desist. Because technology transfers embody disruption costs, systems would, if they could, avoid changing.

By the *Gray Sheet's* definition, a system is open if characterized by two conditions: (1) it is unable to exert a controlling influence on its operating environment, and (2) facilitating technology transfers is its fundamental organizing principle.

If condition (1) obtains, then condition (2) is required for the system to sustain itself. To the extent that the system is structured to ease the introduction of new technologies, the system is "open"; that is to say, impediments to technology transfers tend to make systems less open.

Open systems will ultimately, by some means, cooperate to standardize system interfaces, so that transaction costs are lowered throughout the environment. To minimize transaction costs that derive from risk, each system should adopt whatever standards

Glossary

System — an organic arrangement of resources, objectives, patterns, results, and schedules. Resources — people, tools (including computers), materials, money, and information. Environment — the proximate domain of the system within which the system operates. Patterns — codes of behavior within systems; people follow processes, computers follow programs. Transaction — within a given environment, an interaction between two systems such that one system's results are another's resources. Transaction costs — the resources required to complete a transaction, including an allowance for risk. System interfaces — standard patterns and techniques employed at system boundaries to lower transaction costs. Technology transfer — a process by which systems adopt more productive technologies. Technology transfer costs — the resources required to alter a system and return it to working order.

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are established.

The mechanism for cooperation within the environment could take numerous forms, but it is safe to say that, in the absence of any central authority, the most stable would be representative. However, it is important to note that combinations of minorities with strongly vested interests could have destabilizing effects on the cooperative. Thus, another parameter of a system's openness is the efficacy of the rules of enfranchisement.

Of course, if a system fails condition (1), such that it dominates its environment, condition (2) could still be in force. In this situation, the powerful system will act to dictate standard interfaces to its operating environment, thereby lowering its own transaction costs, although in the process it potentially forces nearby systems to operate under great risks and relative inefficiencies. The environments these systems control can be called "standards-based operating environments" (SBOE). One final point: when an SBOE is inefficient relative to other systems in its proximity, in could effectively tax its partners by unilaterally adjusting interfaces, or by some other means, if doing so costs less than a technology transfer.

In the event that condition (1) applies, but not condition (2), the system is deemed "Osborne Computer-like" and is, for our purposes, forgotten.

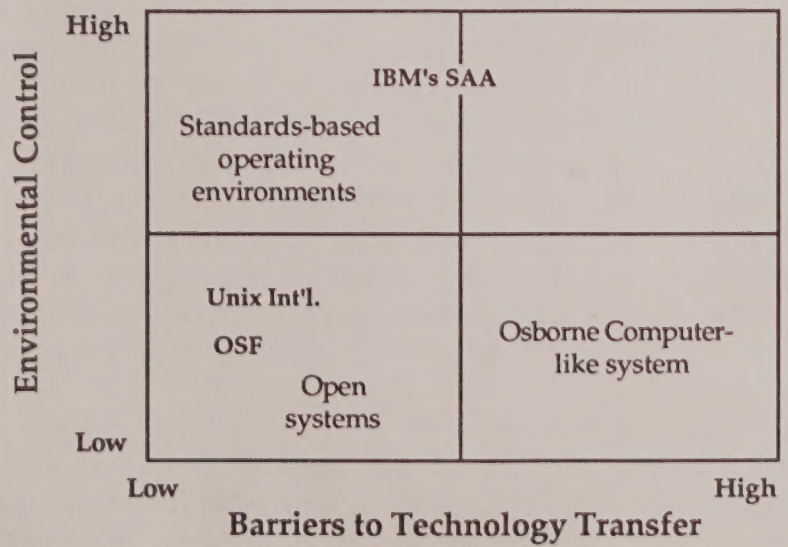
For Example: SAA vs. OSF vs. UI

By the *Gray Sheet's* definition, IBM's SAA is an SBOE, although it contains numerous barriers to technology transfer because it contains so many ancient software interfaces. IBM will largely be able to dictate to the market the scope and schedule of technology transfer in SAA. Other market entities will probably be forced to incur significant transaction costs to maintain SAA compliance.

OSF and Unix International, in contrast, should be much more open, which is very good since that's what they claim to be. But, by our definition, AT&T's large role in UI (see the *Gray Sheet*, 24:19, March 14, 1989) would make UI a bit less open by comparison to OSF. The technology transfer costs for each should be lower than for SAA, given Unix's smaller mass of existing code. It will be interesting to see how all behave.

A Taxonomy of Openness for Standard Software Architectures, Selected Examples

(Source: International Data Corporation, 1989)



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During these confused times, it's important that vendors collect so that market signals don't get scrambled. By lowering competitive risks, more innovative technologies might see the light of day.

In addition to pure budget and risk relief, open systems could assuage the stress collectively facing MIS, vendors, and end users in five important ways:

- Greater homogeneity in the network could simplify network management and the costs of implementing changes in network and system configurations. Users would find it easier to develop their own standard IT principles and architectures satisfying those principles.

- Hardware vendors could more easily beg, borrow, and, well, buy technology from each other, greatly streamlining the expensive process of system software development. Development efforts could concentrate on adding value.

- If system software interfaces are made more consistent, better price/performance and more functional hardware technologies would be introduced more easily.

- Software vendors would have larger bases of software to sell into. Fewer resources would have to be dedicated to activities such as supporting multiple environments and porting from one platform to the next. More resources could be earmarked for innovation. A larger, more robust portfolio of packaged software would be made available to the industry.

- End users would ascend learning curves faster and find it easier to transport data and applications from system to system.

One most unsexy, but, in the *Gray Sheet's* opinion, critical area that could receive a big boost from open systems is documentation. If maintenance were made easier by more standard ways of organizing and presenting docs, the useful life of a software or hardware system could be lengthened considerably. Rarely is it mentioned as an open systems objective.

Does Unix = Open Systems?

Much open systems activity in the market is geared towards Unix not so much by design as by fate. Although its high portability and cheap licensing costs made it a natural choice for many hardware start-ups, the industry is not herding towards open systems because of Unix per se. But Ma Bell's favorite operating system is greasing the wheels.

Survey work performed by IDC in August of 1988 indicates the extent to which common operating systems have captured the minds of users. In three different classes of shop, large commercial (>$400M annual revs), small commercial (≤$400M annual revs), and large technical (>$100M), IS directors indicated that the need for more homogeneous operating systems is among their chief open systems priorities.

Digital has been betting that users will choose VMS to play this role. It once seemed that IBM was hoping to

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MIS Priorities for Open Systems, Results of a 3Q88 IDC Survey on Open Systems

(Source: International Data Corporation, 1989)

1 = highest priority Standard	Smaller Commercial Site (≤$400M)	Large Commercial Site (>$400M)	Large Technical Site (>$100M)
Operating system	1	1	1
Programming language	1	1	2
User interface	1	2	2
Network architecture	2	3	3
Document architecture	3	4	3
Database	2	3	4
4th generation language	4	5	5

make VM the OS of choice across different-sized platforms. However, the *Gray Sheet* believes that Unix will emerge as the leading candidate to satisfy those situations requiring distributed, and homogeneous, solutions.

But that doesn't mean Unix-based systems will dominate corporate accounts top to bottom. The real acid test for determining Unix's place as customers strive to build more efficient systems is: can the open systems movement deliver Unix mainframe functionality through an open process?

The *Gray Sheet* thinks not. Developing, building, and supporting mainframes is a highly integrative activity, probably beyond the scope of the existing open systems movement. Besides, the S/370 architecture certainly dominates the mainframe space enough to be called standard, and IBM's Systems Application Architecture certainly has many attributes of openness.

Conclusion

Open systems is not another stage or wave of technology. It is better viewed as a second generation of information systems characterized by more flexible and less expensive IT technologies — and vastly different management challanges.

During the next 25 years the *Gray Sheet* will visit many topics and speak of technologies beyond today's imaginations.

However, chances are that no matter what the new program or product is, it will be developed along the lines of innovation being drawn today, during the transition to open systems.

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Sun Spots. First came the good news: Sun has bagged its biggest OEM deal to date with Toshiba's agreement to develop SPARC-based PCs running Sun's version of Unix and Open Look. There is obviously a danger that Toshiba could steal some of Sun's low-end thunder, but Sun finally has a high-volume SPARC partner.

Then the other shoe dropped. Sun announced that profits would be down sharply for the quarter, and that the company might even experience a loss. Reasons given were too many for comfort (a new mainframe MRP system, a shortage on new components, an unexpectedly high demand for older workstations). The bottom line seems to be that Sun's management skills are being stretched thin by its explosive growth at the very moment when its competition is getting keener.

Prime Rate Drop. First Prime played its final trump card in its struggle against MAI's hostile takeover bid -- put up the money, or shut up. MAI then lowered its offer from $20 a share to what it called $19.50, but only for 75% of the company; the rest would be paid in securities that would bring the blended share price down to $18-$18.50. Prime then postponed its annual meeting (and hence the proxy fight against MAI's slate of directors) from June 14 to July 26, apparently in an effort to buy time to go back to the other potential buyers who balked at beating MAI's initial bid. Prime also indicated that it was considering other steps, including a possible recapitalization. MAI has gone to court to fight the attempt to change the annual meeting date. A sitdown between Prime and MAI management soon degenerated into a micturition contest.

Ardent Japanese Sugar Daddy. Pressed to complete development and marketing for the Titan follow-ons scheduled for a fall 1989 introduction, Ardent has turned to Kubota Ltd. for an additional $50 million, half in equity financing this year, the rest in long-term load and development agreements over the next few years. The agreement more than doubles Kubota's equity stake in Ardent, to about 44%.

Decisions, Decisions. It is presently unclear whether Digital will offer high-end VAX systems based on both the 21- and 30MIPS variants of the VAX 9000 "Aridus" CPU (see "Digital's Mysterious High-End" in Vol. 24, No. 23-24, May 23, 1989). While this is a marketing decision that can be deferred until product introduction time, the **Gray Sheet** now believes that DEC may base all Aridus configurations on the 30MIPS version of Aridus.

More Tandem Tools. In conjunction with the announcement of Release 2 of NonStop SQL, Tandem unveiled an agreement to develop and market Oracle database tools for its RDBMS. Oracle tools join products from RTI, IBI, and Arthur Andersen.

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REVIEW & FORECAST PART I

THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR MAY 23, 1989 • VOL. 24, NO. 23-24 PATRICK J. MCGOVERN, PUBLISHER

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Mainframeland in 1989

In beginning last year's annual "Review and Forecast of the Large-Scale Systems Market," the *Gray Sheet* pondered what had changed substantially in 1987. It answered not much.

It would be plausible to say the same about the market in 1988 as well. Nothing about the last 15 months or so constitutes sweeping adjustments in mainframe industry trends. For instance:

- U.S. shipment growth, in terms of both revenue and units, remained unimpressive, even lackluster. For the fourth year in a row, shipment value increased less than 5%, growing by 2% to $9.2 billion. Units shipped actually fell 12%, to 1,480 systems.

- Worldwide, mainframers had a strong revenue year — worldwide shipment value grew 9% — as international business once again outpaced the U.S. However, like the U.S., value growth was largely a function of net upgrade activity and customers buying more expensive, not more, systems. The number of units shipped worldwide dropped 11% in 1988.

- Strong international business, in turn, is a function of both exchange rate craziness in 1988 and decent real demand for mainframes overseas.

- The large systems business is increasingly dominated by IBM and its 25-year-old S/370 mainframe standard. In 1988, IBM and its PCM competitors accounted for 83% of the worldwide shipment value of large systems by U.S.-based companies, or $16.7 billion dollars.

However, in addition to observing how the results of competition in large-systems have remained the same, last year the *Gray Sheet* also opined that, as a result of stimulus from a variety of sources, the market was likely to become far more active.

The most prominent changes have been in name, but not only. National Advanced Systems has become a subsidiary of Hitachi Data Systems, Honeywell has become Honeywell Bull and then Bull H N, CDC has dropped its ETA addendum, and Cray Research has created Cray Computer.

Of course, these moniker adjustments reflect deeper changes as mainframers in 1988 shuffled worldwide positions to not only better cope with, but take advantage of, downsizing and other significant industry trends. Consider the following:

- The viability of cooperative processing between host and desktop resources makes possible information

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systems comprised of massive wide-area networks and dispersed, very large databases. Managing these resources might best be done from a central, mainframe-based location. Mainframers are introducing technologies designed to satisfy emerging administrative requirements (e.g., IBM's Enterprise Systems Architecture [ESA]).

- Wide-area information systems will certainly cut across national borders. Accordingly, mainframers, both U.S.-based and foreign-owned, are reorganizing to compete better on a global scale. In addition to sales and marketing functions, development and manufacturing are being relocated to exploit local advantages and opportunities (e.g., Hitachi Data Systems).

- Recent events in supercomputing are focusing political attention on the U.S.'s ability to compete in this key technological industry (e.g., CDC's shut down of ETA, Cray's mitosis).

- The mainframe is being perceived as a dinosaur: slow and reluctant to change despite a radically altered environment. To avoid the strategic equivalent of extinction — gradual attrition of a captive constituency to more productive technologies — mainframers are busily developing new routines for bringing innovative larger systems technology to market quicker (e.g., Amdahl's "better than compatible" technologies like Multiple Domain Facility, Unisys's OEM arrangements with Sequent).

As the IT industry continues to transition, the common objective of mainframers is to leverage existing customer commitments by adding new functions to make mainframe-type processing an absolute necessity in large accounts. Each is pursuing this objective according to its own combination of positions and capabilities.

IBM: Things Are Slow at Home

Since 1984 IBM's worldwide large systems business has grown an average of 6% a year, the industry average. Of course, in light of IBM's 74% worldwide market share, the fact that its growth has tracked the industry's growth is not surprising — the industry tracks IBM.

Big Blue's entire worldwide growth in the past five years has come from expansion overseas. IBM's U.S. large systems business has experienced no growth since 1984; international has grown 12% compounded annually. As a result, international sales today account for 56% of IBM's mainframe business. Contrast that figure with the 1984 split of 54% U.S., 46% international.

In 1988, the fervor created by its ESA announcement allowed IBM to regain a few of the worldwide share points it lost in 1987. Moreover, most of the new S Model ES/3090s were shipping in volume during the fourth quarter, which fattened IBM's high-end coffers.

IBM is looking to cultivate and add to

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U.S.-Based Mainframer Highlights of the Past 12-18 Months

(Source: International Data Corporation, 1989)

Company	Event	Effect
IBM	2/88 MVS/ESA/SMS announced	IBM buying intentions rise, PCMs put on defensive.
	8/88 ES/3090 S Models unveiled	14-19% price/performance kick, attractive upgrade plans.
	12/88 Arbitration settles software dispute with Fujitsu	Japanese mainframer gains access to critical S/370 OS interfaces.
	1Q89 Logic chip problems delay S Model upgrades	IBM hikes prices across offerings 5%, warns investors of bottom-line concerns.
Amdahl	4/88 5990 CPU, 6100 storage processor debut	Two models of 5990, derived from Fujitsu M-780 machines, offer top S/370 price/performance. Expanded storage feature in preparation for ESA support.
	9/88 ESA timetable announced	Amdahl commits to 4Q89 implementation w/o major performance hits.
	4/89 3 new 5990 models introed	Two smaller, one midrange add to line.
Hitachi Data Sys. (NAS)	6/88 Logical partitioning (LPF), fiber channels, and lights out operations support for AS/XL,VS systems.	LPF answers IBM's PR/SM and Amdahl's MDF. Channels and lights out advance HDS ahead in these areas.
	9/88 AS/EX machines debut; ESA schedule announced	Response to IBM S models, Amdahl 5990. Absolute high-end performance still lags 20-25%. ESA promised by 4Q89.
	2/89 Hitachi/EDS combine agree to purchase NAS for $398 million	Memorex-Telex unable to finance deal. Hitachi appears interested in reorganizing worldwide channel strategy. EDS gains flexibility in dealings with IBM.
Unisys	8/88 Inks alliance with Computer Associates	Largest IBM ISV agrees to move many of CA's S/370 apps, tools, and data center ops products to 2200/1100 class machines.
	9/88 Intros 2200/600 class	New high-end machines (Sperry lineage) and enhanced system software programs offer very competitive TP performance.
Cray	9/87 Whiz designer Steve Chen departs	In 12/87 IBM backs new Chen venture, Supercomputer Systems.
	2/88 Cray Y/MP announced	Gives X/MP customers room to move and reflects strong Unix commitment.
	5/89 Cray mitosis creates Cray Computer	Legendary designer Seymour Cray leaves to pursue own vision in smaller environment. Cray Research stresses commitment to installed base and a strong U.S. supercomputer industry.
CDC	4/88 Cyber 960 intro	CDC's new mainframe midpoint.
	4/89 ETA RIP	CDC moves to remarket Cray machines.
Bull H N	11/88 Titan unveiled, new DPS 9000 machines	Upgade path for GCOS 8 users.
HNSX	4/89 SX-X debuts	Unix-based, 2.9ns CPU reportedly delivers 20GFLOPS.

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the excitement by staggering important hardware and software announcements over the next few years. Assuming logic chip yield problems are indeed under control, the company is expected to introduce another incarnation of the ES/3090 — the "G" series — early next year. Anticipated improvements to the I/O subsystem should take customers one step closer to a 1991 Summit announcement.

On the software side, the recent introduction of SAA OfficeVision indicates IBM's intention to predicate major program directions on cooperative processing. Further announcements in important application areas will similarly assume that customers link IBM "programmable" workstations (a new term, much better than "intelligent" workstations) with hosts.

(Note to our readers: the *Gray Sheet* will more fully explore IBM's mainframe futures in a forthcoming issue.)

Amdahl: Sharp Minds and Quick Feet

Without question, the most successful U.S.-based general-purpose mainframer this decade has been Amdahl. Between 1982 and 1988, IBM's chief large systems nemesis has enjoyed a 25% CAGR. During this time, it has seen its worldwide market share grow from 3% to 7%.

Amdahl's U.S. business still generates the majority (53%) of sales. Moreover, the company's strong performance is not solely a function of international windfalls. Although overseas business has grown at a CAGR of 27% since 1984, U.S. sales have increased on average 14% per year, well above the 1% CAGR experienced by the U.S. market as a whole.

During 1988, Amdahl anticipated IBM's S announcement by introducing the 5990 family in April. Three additional models of the 5990, the models 350, 500, and 1100, all based on Fujitsu's M-780 machines, were announced in April, 1989.

The *Gray Sheet* expects this behavior to continue. Amdahl will in all likelihood work to undercut IBM's generational transitions at the high-end by as much as six months, and gradually fill in the line as demand warrants. Given our timetable for a new Summit uniprocessor, you might expect Amdahl's next generation in late 1991.

Finally, for two reasons Amdahl seems to be truly committed to mainframe Unix, unlike its PCM competitors. First is that AT&T is one of Amdahl's leading customers. Second, Amdahl may see Unix as a route to greater control of its own destiny. If Unix on the S/370 does come into greater vogue, IBM may be forced to play catch up to Amdahl.

Hitachi Data Systems (aka NAS)

NAS's well-publicized recent difficulties, which dropped worldwide revenue growth to 7% last year and ultimately resulted in a change in ownership to Hitachi Data Systems, or HDS (see the *Gray Sheet*, 24:20, March 27, 1989), can't completely overshadow six years of 19% CAGR worldwide sales performance since 1982. Its $640 million in 1988 worldwide sales translates into a 3%

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share of the total market for U.S.-based large systems vendors.

Like its large systems brethren, NAS has enjoyed superior international growth. From 1984 to 1988 NAS's international business grew 25% per year, whereas U.S. grew 11%. On both counts, NAS's performance on average was slightly worse than Amdahl's. By 1988, 50% of then-NAS's business accrued from international sales, up from a 1984 level of 38%.

A new air-cooled AS family, the AS/EX models announced about a month after IBM's S announcement, kept HDS competitive with the midrange of IBM's and Amdahl's S/370 mainframe offerings. The *Gray Sheet* expects HDS to continue to behave more conservatively than has Amdahl.

Unisys: Two Bunch Warmers

After growing 25% per annum in the worldwide large systems market between 1982 and 1985, Unisys has seen its mainframe business shrink at a rate of 5% per year since. Large systems sales from the old Sperry side of the house has been particularly sluggish since 1982.

IDC estimates that in 1988 Unisys captured 7% of the mainframe market both in the U.S. and abroad. It, like IBM, has benefitted greatly from the international currency dynamics. Unisys has seen its U.S. sales slip 6% a year since 1984, but its international revenues have grown 4% a year. Last year international accounted for 54% of Unisys's large system's revenues, up from 45% (combining Burroughs and Sperry for a pro forma comparison) in 1984.

Cray Research: Nurturing a Niche

If growth is the measure, Cray Research has been the 1980s' most successful mainframer. From a modest $120 million in sales in 1982, the supercomputer leader has grown 30% per year to a 1988 figure of $570 million. Cray also holds the distinction of being the only U.S.-based large systems vendor actually to grow at a faster rate between 1985 and 1988 (33% CAGR) than it did between 1982-1985 (26% CAGR).

Cray Research's recent decision to spin out founder Seymour Cray's GaAs Cray 3 project addresses important financial, organizational, and product concerns. From a financial standpoint, it became clear that the company could no longer support two parallel $50 million per year R&D efforts. Rather than scuttle one of them, the company gave each a separate ledger. Cray Computer, the new entity, will have to prove its own financial viability over time.

From an organizational standpoint, Cray Research apparently felt a different work style, one geared more towards teams and schedules, was required if growth were to continue. Cray Computer's culture, in contrast, will undoubtedly feed sporadic moments of individual genius.

Finally, from a product standpoint, in the face of greater Japanese and, perhaps, IBM competition, Cray Research correctly believed its greatest asset is its installed base. While Cray Computer sails into relatively uncharted technology waters, Cray Research will strive to

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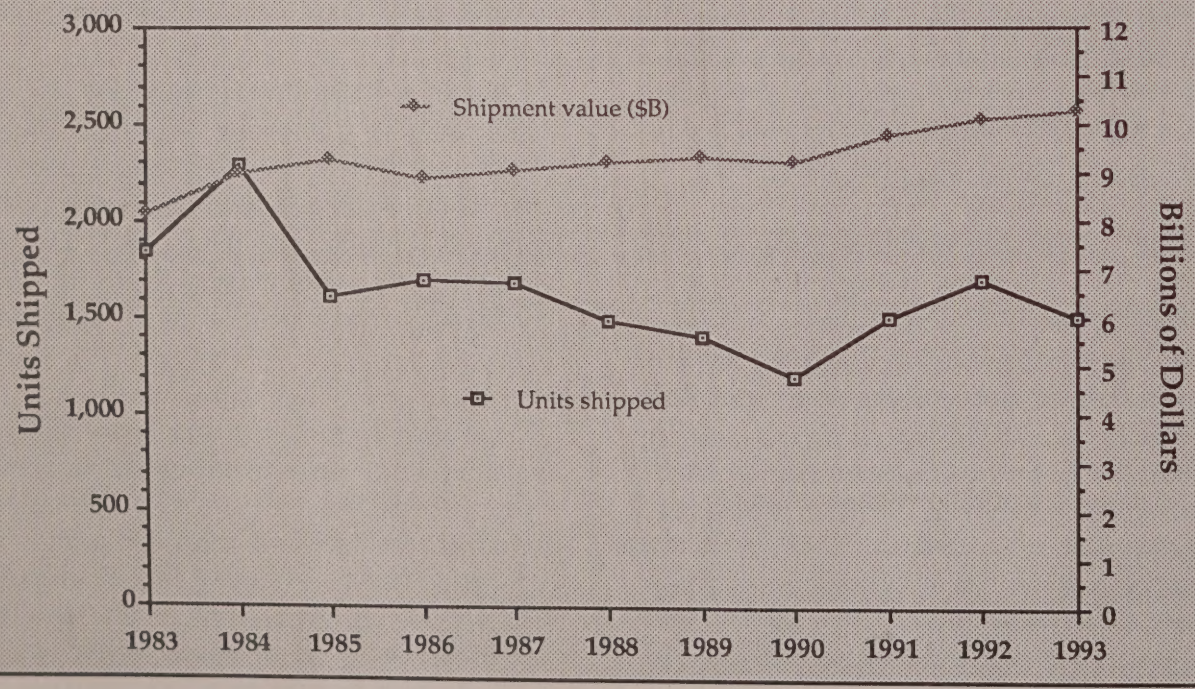
U.S.-Based Vendors' Worldwide Value of Large-Scale System Shipments, 1984-1988

(Source: International Data Corporation, 1989)

	1984		1985		1986		1987		1988	
	M $	Mkt %	M $	Mkt %	M $	Mkt %	M $	Mkt %	M $	Mkt %
IBM Base	12,750	79%	13,720	81%	14,300	81%	15,230	82%	16,760	83%
IBM	11,750	73%	12,670	75%	13,100	75%	13,500	73%	14,800	74%
Amdahl	660	4%	690	4%	750	4%	1,130	6%	1,320	7%
NAS	340	2%	360	2%	450	3%	600	3%	640	3%
Non-IBM Base	2,575	16%	2,730	16%	2,690	15%	2,765	15%	2,750	14%
Unisys	1,410	9%	1,610	9%	1,400	8%	1,390	7%	1,360	7%
Cray	165	1%	240	1%	450	3%	520	3%	570	3%
CDC	480	3%	400	2%	420	2%	420	2%	400	2%
Bull H N	430	3%	460	3%	410	2%	410	2%	390	2%
Digital	90	1%	20	0%	10	0%	0	0%	0	0%
Other and Third-Party Peripherals	720	4%	520	3%	560	3%	580	3%	650	3%
Total	**16,045**	**100%**	**16,970**	**100%**	**17,550**	**100%**	**18,550**	**100%**	**20,130**	**100%**

U.S. Large Systems Market — U.S.-Based Manufacturers

(Source: International Data Corporation, 1989)



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Large-Scale System Market—U.S.-Based Manufacturers

(Source: International Data Corporation, 1989)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	Annual Growth in Value
		Worldwide		
1983	3,130	16,710	14,500	30%
1984	3,750	18,470	16,045	11%
1985	3,130	19,290	16,970	6%
1986	3,250	20,750	17,550	3%
1987	3,480	21,160	18,550	6%
1988	**3,080**	**21,520**	**20,130**	**9%**
1989	2,800	22,300	20,900	4%
1990	2,300	22,700	21,000	0%
1991	2,700	23,200	22,000	5%
1992	3,300	24,500	22,800	4%
1993	3,100	25,700	23,500	3%
		United States		
1983	1,850	9,600	8,190	20%
1984	2,290	10,790	8,990	10%
1985	1,610	11,090	9,290	3%
1986	1,690	11,930	8,880	-4%
1987	1,680	11,750	9,040	2%
1988	**1,480**	**11,550**	**9,240**	**2%**
1989	1,400	11,600	9,330	1%
1990	1,200	11,700	9,250	-1%
1991	1,500	11,900	9,800	6%
1992	1,700	12,500	10,100	3%
1993	1,500	13,000	10,300	2%
		International		
1983	1,280	7,110	6,310	46%
1984	1,460	7,680	7,055	12%
1985	1,520	8,200	7,680	9%
1986	1,560	8,820	8,670	13%
1987	1,800	9,410	9,510	10%
1988	**1,600**	**9,970**	**10,890**	**15%**
1989	1,400	10,700	11,570	6%
1990	1,100	11,000	11,750	2%
1991	1,200	11,300	12,200	4%
1992	1,600	12,000	12,700	4%
1993	1,600	12,700	13,200	4%

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employ more proven technologies in higher-performance designs compatible with existing machines.

CDC: Still Retrenching

Of the traditional mainframers, Control Data has had the least success this decade. During the 1982-1988 time frame the U.S.-based large systems industry grew 10% worldwide; CDC's grew $10 million.

Further indications of CDC's sluggish performance can be found by looking at the company's U.S./international growth rates. During the dollars fall between 1984 and 1988 CDC's worldwide sales grew only 3% per year. At the same time, its U.S. business dropped 10% per year.

CDC's $400 million in 1988 sales was evenly split between U.S. and international. Performance in 1988 was consistent with the trend established by previous years: U.S. revenues fell 9%, international sales were flat.

One recent casualty of CDC's recurring difficulties is six-year old, but never profitable, ETA. In pulling the plug on ETA and subsequently restructuring the Cyber mainframe business, CDC is expected to consolidate up to 3,500 jobs and take up to $470 million in second quarter charges.

Bearish Times for Bull H N

Bull H N's recent growth derives from a strong Italian and UK presence. Like all non-PCM general-purpose mainframers, Bull H N's U.S. business, which has been shrinking at a rate of 5% per year, could be described as slow at best. In 1984, the company generated $250 million in the states; by 1988 this figure had slipped to $200 million.

To jump-start its stalling business, an ambitious campaign to increase Bull H N's name recognition has begun here in the states. Moreover, the company is apparently attempting to lower costs and improve its ability to manage manufacturing by moving operations from Arizona closer to headquarters in Massachusetts. Further moves to relocate capacity from Japan and NEC to Bull H N are possible, but not imminently expected.

Conclusion

The mainframe business, by far the most mature market in the computer industry, is nevertheless experiencing significant growing pains.

On the whole, IDC expects new product generations from the major vendors to be introduced in the early 1990s. These machines will be the first mainframes built with cooperative processing in mind. To stay synchronous with advances on the desktop, they will maximize flexibility, while at the same time stressing reliability, security, and investment protection.

With IBM delimiting functional directions in the commercial realm and Cray setting the pace in supercomputing, the worldwide mainframe market should grow between 1988 and 1993 an average of 3% per year. The market is certainly not smokin', but neither is it disappearing.

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A Special *Gray Sheet* Report with Terry Shannon of IDC's DEC Advisory Service:

Digital's Mysterious High-End

Digital is faced with the great challenge of demonstrating to its customers that it is capable of delivering a well-balanced system (CPU, vector facility, I/O subsystem, system software, and database) based upon a high-performance VAX uniprocessor (>20MIPS). For two reasons, in the *Gray Sheet's* opinion, the lack of such a system is DEC's most pressing weakness.

First, the "bet-your-business" Fortune 500 customers Digital is targeting still very much require mainframe-class processing power; indeed, in the *Gray Sheet*'s opinion these customers view the centralized network and database management functions performed best by mainframes as an integral, even central, component in any comprehensive, long-term information technology system. Without a viable mainframe option, Digital is forced to share, perhaps even defer, primary supplier status in its most strategic accounts.

Second, the mainframe market continues to be among the most profitable segments of the computer industry. Without a mainframe offering, Digital is forced to increasingly rely on its lower-margin business of selling smaller MicroVAX-and-VAXstation-type machines (see the *Gray Sheet*, 24:11-12, Dec. 9, 1988).

The *Gray Sheet* believes DEC has dedicated significant resources, spread across numerous product groups, to developing a competitive high-end VAX. The effort has encompassed Digital's High Performance Systems Group, Midrange Systems Group, and Storage & Information Management Group (storage products, database, and tools), among many others.

The combination has produced numerous highest-end pretender machines from DEC, but no leaders. For instance, in January 1987, Digital visited New York City to roll out the heralded 897X machines, preconfigured VAXclusters that were supposed to go head-to-head with IBM 3090s. But because of VMS limitations they were brained by IBM's high-stepping 3090 kneecaps instead.

Most recently came the symmetric multiprocessing (SMP) supermini 8800s, announced this time last year. The four models were advertised as delivering a range of 6.5 VUPS (6.5 times the performance of a VAX 11/780) to 24 VUPS. But they too went nowhere; IDC estimates that between April and December of last year only 200 8800s were shipped worldwide.

Digital's best selling larger system in 1988 was the truly mini (no super prefix) 6200 family. IDC estimates the 6200 last year generated $1.3 billion for Digital after its May introduction.

DEC's High End Spring This Fall

The *Gray Sheet* believes that Digital this October will introduce a pair of air-cooled VAX systems that will represent the company's best VAX mainframe

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attempt to date. They will incorporate technology initially developed for the water-cooled "Aquarius" machine — a project reportedly cancelled after Mr. Olsen expressed disapproval of complex liquid-cooling mechanisms, and after DEC's engineers were able to demonstrate exemplary reliability characteristics with air.

The systems, referred to as "Aridus" and "Aridus-Plus," will generate at least three times as much scalar performance as existing uniprocessor VAX machines; ultimately, larger multiprocessor (MP) configurations should deliver as much as 100VUPS.

Different CPU and bus clock speeds account for the difference in performance. To yield 30VUPS of CPU performance and 1GB of system bus bandwidth, the Aridus-Plus system is expected to sport a clock speed of 16ns. The Aridus clock should run about 30% slower, at 23ns, to deliver about 21VUPS and 660MB/s of aggregate system bus bandwidth.

Initially, the *Gray Sheet* expects Digital to make available single and dyadic versions of both Aridus and Aridus-Plus. Over time, triadic (75VUPS) and quadratic (100VUPS) machines built with the more powerful Aridus-Plus CPU should be made available. Given current intelligence, the *Gray Sheet* does not expect to see larger than two-way configurations of the smaller Aridus engine.

Digital will complement the five-fold increase in CPU performance with a similar upgrading of the VAX's input/output (I/O) subsystem. The channel subsystem in Aridus-class machines will be based on the VAX 6XXX's XMI bus. Fully configured, this subsystem should deliver up to 200MB/s of aggregate throughput between CPU and peripherals, far in excess of the 30MB/s currently possible with the 88XX systems.

Additionally, both systems are likely to offer a direct XMI-bus to CI-bus (VAXcluster Computer Interconnect), thus eliminating the VAXBI-bus as an I/O bottleneck on a high-performance VAXcluster node.

Floating-point performance on Aridus and Aridus-Plus systems should receive a significant boost from integrated vector acceleration hardware. However, The *Gray Sheet* believes that in effecting design tradeoffs, Digital opted for improving capacity for general commercial transaction processing workloads at the expense of scientific/technical capabilities.

To increase system availability, and assure a strong cost-of-ownership story, nearly one-third of Aridus's real estate is said to be dedicated to diagnostic and reliability features. Dedicated hardware resources will monitor system integrity, run proprietary predictive diagnostic applications and schedule the replacement of field-replaceable system components on an as-needed basis.

Then What?

Digital has never announced a strategic hardware platform unless a follow-on product is waiting in the wings (Aridus had been simulated

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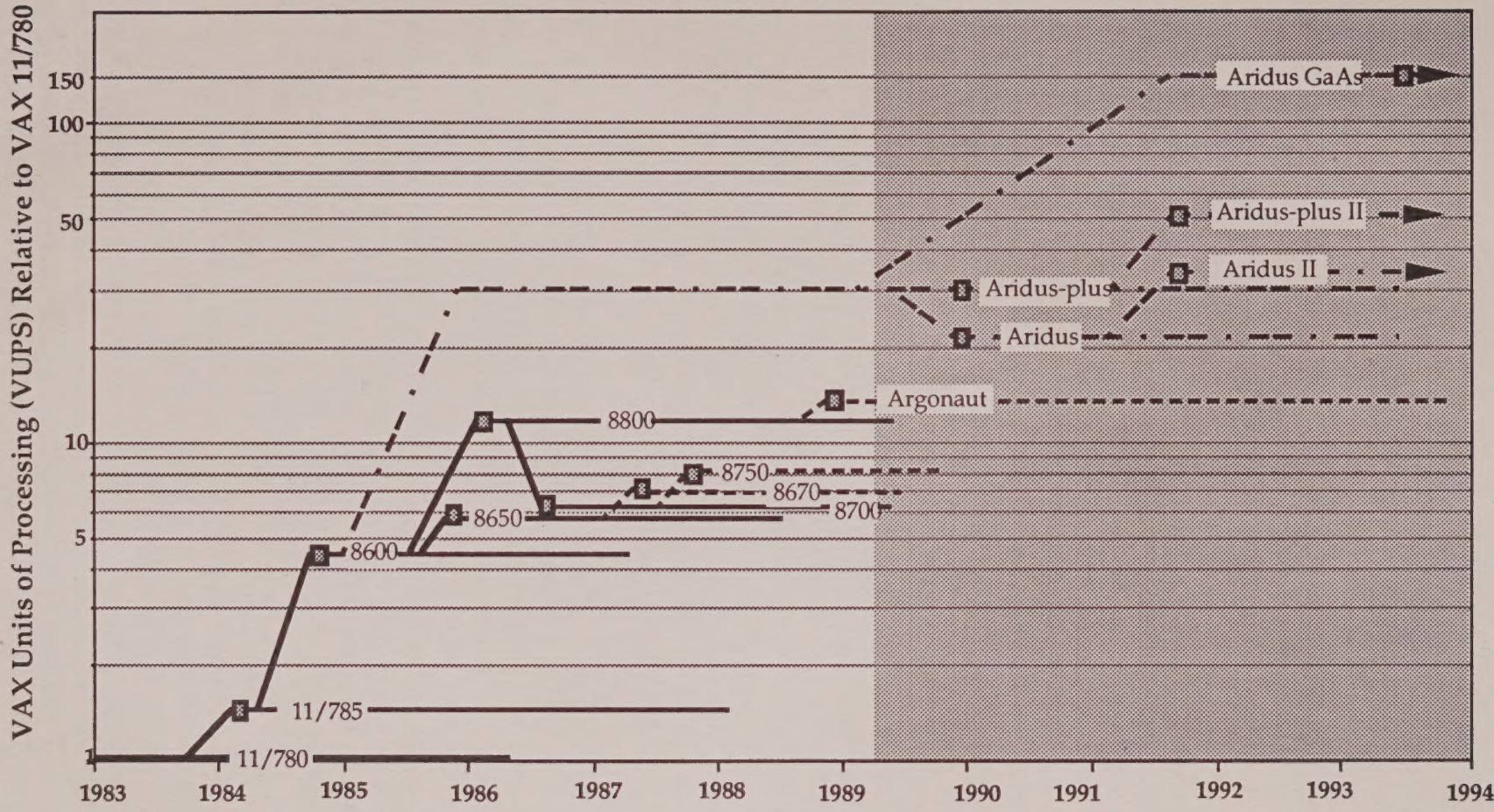
Digital's Road to the High End

(Source: International Data Corporation, 1989)



How to read this chart The Y-axis is a logarithmic VUPS scale; the X-axis details product lifes. Thus, the VAX 8650 at about 6VUPS began shipping 3Q85 and ceased shipping in the middle of last year. As the chart indicates, the 8600 spawned three sets of products: the 86XX family, the 88XX/87XX machines, and the still unannounced Aridus class of CPUs.

Legend

- Announced products
- Cancelled products
- Unannounced products

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and development was well underway when the VAX 8600 was announced). This fall's high-end VAX rollout should prove to be no exception.

Digital's current doctrine is to offer an average 50% per year price-and-performance increase on its low-end and midrange VAX systems. If only to meet the RISC threat, Digital may find it necessary to adopt a similarly aggressive price-and-performance enhancement strategy at the high end to maintain the viability of high-performance VAX-based systems.

The *Gray Sheet* further anticipates that Digital, like IBM, will favor performance enhancements over system price reductions in order to protect margins. By applying Digital's 50% per year low-end/midrange VAX price-and-performance enhancement metric to the performance side of the high-end VAX equation, we can reasonably expect future high-performance VAX systems such as:

- Second-generation Aridus and Aridus-Plus followons offering an estimated 30 and 50VUPS of uniprocessor performance respectively. Such systems, which could incorporate a 2GBS system bus and a higher-bandwidth XMI I/O subsystem, could appear by mid-1991.

- A third-generation implementation of Aridus-Plus that delivers well in excess of 100VUPS of uniprocessor performance. Based on Digital's investment in gallium arsenide supplier GigaBit Logic, it is plausible that gallium arsenide will play a prominent role in a third generation Aridus-Plus system in the 1993 timeframe.

- High-performance VAX multiprocessor systems configured with more than four CPUs. The only obstacle to the introduction of such systems is the availability of higher-bandwidth system buses. The *Gray Sheet* believes that Digital will successfully address this issue, enabling the firm to offer higher levels of multistream performance through six- and eight-processor Aridus system configurations.

Conclusion

Aridus represents a quantum leap in the technological capabilities of the VAX architecture. But Digital's mainframe success is predicated on more than hardware technology. DEC's marketing, selling, and support business systems must likewise be upgraded to compete head-to-head with IBM.

One critical area that has received considerable attention to date, and is bound to receive more, is online transaction processing-oriented software.

When Digital first introduced its DECtp family of programs (see the *Gray Sheet*, 24:4, July 22, 1988), the *Gray Sheet* stated that "until [higher-performance VAXes are available], DECtp will probably not become a major alternative in the high-end OLTP market."

As the market's lukewarm reception of the 88XX family indicates, we were correct. However, the Aridus generation should remedy this shortcoming.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR APRIL 28, 1989 • VOL. 24, NO. 22 PATRICK J. MCGOVERN, PUBLISHER

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HP Walks M&A Aisle with Apollo

Opportunity knocks infrequently, and usually only briefly and faintly. For Hewlett-Packard, opportunity called in the form of Apollo Computer and the chance to leap to the forefront of the rapidly changing technical workstation market. Hewlett-Packard, ever intelligently opportunistic, has made the most of it.

Moreover, HP did it in style. The two companies made known their definitive agreement on the same day that rival Sun kicked off a shindig to introduce a slew of new products (see page 7). The news of HP/Apollo eclipsed Sun's festival on the fronts of most trade journals and business pages.

The terms of the offer call for HP to pay $13.125 for each of Apollo's 36.3 million outstanding shares, or $476.4 million. Apollo's board has unanimously approved the action and has called upon Apollo's stockholders to tender their shares by May 15, the offer's deadline. Assuming all goes well, it will take HP about a month thereafter to legally complete the transaction.

Of course, most of the real work doesn't start until after the papers are signed, sealed, and delivered. This is the first time in memory that HP has taken the treacherous acquisition track to effect a major adjustment to its competitive position. While Apollo brings HP some real benefits, it also engenders numerous challenges. Consider the following:

- Benefit: If measured by year-end 1988 results, for $475 million HP buys about 17% of worldwide workstation shipments and the number two shipment slot, 22% of the worldwide workstation installed base and the number one installation slot, and a company with revenues of $650M.

- Benefit: Apollo brings to HP some major OEM and VAR agreements in competitively key application markets, such as Mentor Graphics in ECAD. A strong position in reseller

1988 U.S.-Based Leaders in the Workstation Market
(Source: International Data Corporation, 1989)

Worldwide Unit Shipments		Worldwide Installed Base	
1. Sun	38%	1. Sun	34%
2. DEC	24%	2. Apollo	22%
3. Apollo	17%	3. DEC	19%
4. HP	10%	4. HP	13%
Other	11%	Other	12%
180,000 Total Units		381,000 Total Units	

channels will be critical as the workstation market evolves.

- Benefit: In addition to marketing partners, Apollo sports a listing of over 1,500 independently supplied software packages for its 68K-based Domain platform.

- Benefit: HP Unix development resources are significantly increased. Some workstation-specific Unix projects that had to be delayed because of HP's corporate Unix priorities could get a big boost.

- Challenge: HP has never undertaken an acquisition of this size. Over 4,000 employees, a complex network of market partnerships, numerous manufacturing and development sites, and a decidedly East Coast culture must be integrated into HP's day-to-day activities. To be a complete success, the assimilation must be rapid. HP can't afford to see its workstations lag the industry's 12-month product life cycles.

- Challenge: Positioning Apollo's platforms into HP's already full range of workstation products will require a crowbar. Of all the Apollo products, only the Series 10000 high-end graphics workstations fit easily.

- Challenge: Prior to Apollo, HP sold three workstation hardware platforms: an Intel 80x86, Motorola 68K, and a proprietary RISC machine. Apollo adds another RISC architecture and another 68K software environment. Servicing all these <$100K machines efficiently will require some creative service and support systems.

From the *Gray Sheet's* perspective, the net result of the merger is good. Apollo avoids questions about its viability; HP becomes more of an impact player in the hardware industry's highest growth market, and forecloses anyone else from getting their hands on Apollo.

It Only Takes a Moment

Rumor had it that a number of firms inquired about Apollo's price, including Bull HN, Data General, Siemens, Nixdorf, a couple of Japanese vendors, and (remember, rumor had it) IBM. HP says it first got involved late last January after extensive dealings with Apollo stemming from OSF and HP's decision to license Apollo's Network Computing System (NCS).

Nothing became of the initial overtures, but during the first week of Apri Apollo's CEO, Tom Vanderslice, was contacted while in Tokyo by his counterpart at HP, John Young. Vanderslice called in sick to his Japanese commitments and flew to New York for a few days of heavy negotiations among the two companies and their banker, Goldman Sachs. Within a week the two sides were able to announce the deal.

A number of commonalities and fits facilitated the arrangement. To begin with, both companies rely heavily on

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Motorola for microprocessors and have garnered significant Moto 68K talent over the years. Some efficiencies in manufacturing and purchasing may be possible as a result of overlapping procurement cycles, but this is unclear. Primarily the appeal seems to be that the HP/Apollo combine is overflowing with 68K hardware and software development, service, and support expertise.

Second, the two claim that their customer lists overlap in limited ways. Supposedly, in sites where they are cohabitants, one vendor is favored for one application while the other is favored elsewhere. For instance, Apollo may be on a user's short list for ECAD, while HP is among the favored suppliers for data collection on the shop floor.

Third, each side's organizational and technical capabilities complement the other's. Apollo has developed solid workstation networking and symmetric multiprocessing technologies and, over the years, strong relationships with leading workstation VARs.

HP, on the other hand, is renowned for service and support, products for interconnecting large and small processors, PCs, and, last but not least, generating cash.

Finally, they're both sponsoring OSF, and each espouses a strong commitment to Unix and "open" systems.

The view each holds of itself relative to open systems and that held by its partner, however, differ markedly. In separate conversations with the *Gray Sheet*, HP said that convincing the world of Apollo's belief in open systems was high on HP's list of post-acquisition priorities. Apollo meanwhile expressed concern that HP might attempt to sublimate Apollo's "more aggressive" open systems stance.

I CPU, and PU, and PU, and PU ...

Reconciling their differing viewpoints on each other's position in the open systems derby shouldn't cause too much pain. But merging their product lines might. There is a fair amount of overlap between Apollo's and HP's workstation families, especially in the $15,000-40,000 midrange area.

Apollo's Domain family and HP's Series 300 systems are both based on Motorola's 68K architecture. HP has been an especially aggressive price/performer in the 68K workstation arena, a result of its desire to gain share after a relatively late entrance into the market. Apollo, the industry's founder, has been less competitive from a price/performance standpoint, choosing instead to differentiate itself on the basis of the market's largest portfolio of software applications.

The *Gray Sheet* suspects that for the near term HP will make only minor positioning adjustments to its expanded 68K product set: HP's Series 300s will continue to be price/performance leaders; Apollo's Domain/Aegis customers will be given growth paths to follow.

In the longer term HP might stabilize the 68K Domain family in favor of a single set of 68K products, but this is far from self-evident. If HP should undertake this course of action, it will be

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helped by the fact that Apollo has been preparing its customer base for a migration away from Aegis since the announcement of Domain/OS, a Unix variant.

Although each company possesses a proprietary RISC design, their respective implementations seem optimized for different types of processing. HP's Precision Architecture (HP PA) appears particularly suited to supporting multi-user applications such as database or interactive time sharing. Apollo's PRISM architecture provides affordable and exceptional single-user floating-point and graphics performance.

HP seems honestly to believe that there is more than enough room for two HP-proprietary RISC workstation architectures, but this is one area that deserves close inspection over time.

HP PA will certainly survive. Apollo's PRISM, on the other hand, is still young in its life cycle and, despite being

(continued on page 6)

A Tale of Two Start-Ups

(with Dave Moschella, VP, Systems Research Group, IDC)

The recent acquisitions of first Convergent Technologies and now Apollo Computer open the final chapters for two of the more revealing start-up case studies of the 1980s. Both companies were high flyers that clearly did many things right, but their success was eventually checked by powerful forces their visionary founders never anticipated.

Although the IBM PC will surely go down as the watershed product event of this decade, both Apollo and Convergent (along with Datapoint, Three Rivers, and Onyx) were in many ways far ahead of Big Blue in anticipating long-term technology trends.

Not only were these folks in tune with emerging 16- and 32-bit microprocessor potential, but they also understood the benefits of ergonomics, bit-mapped graphics, local-area networks, and peripheral resource sharing. Long before IBM did, Apollo and CT were delivering the sort of distributed intelligence systems that have done so much to undermine the viability of traditional minicomputer designs.

Despite these similarities, in many ways the East Coast Apollo and West Coast CT became mirror images of each other. Apollo selected Motorola, the technical market, and a direct sales and VAR marketing strategy. CT settled on Intel, the commercial sector, and a straight OEM approach. Bill Poduska was a legendary engineer, Allen Michaels the consummate marketeer.

Yet both companies were done in by a single common flaw in their strategies: they didn't anticipate and adapt to emerging operating system standards. Convergent built its business around BTOS, which was soon routed in the commercial arena by MS-DOS. Apollo rose with Aegis, which has now given way to Unix. In

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EDP industry report
• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 28, 1980 • VOL.16,NO.14 P.J. McGOVERN,PUBLISHER

New Wave for 80s

DISTRIBUTED INTELLIGENCE NETWORKS EMERGE; CHALLENGE MINIS, DDP SYSTEMS

In the 70s we had the mini challenging the mainframe; in the 80s we have the micro packaged as a system, equipped to challenge the mini.

Networked systems announced recently by new companies such as Apollo Computer Inc. and Convergent Technologies aren't faster than speeding bullets or able to leap buildings in single bounds, but they do indeed typify the breakthroughs in processing power, functionality and cost implicit in the decade of the '80s. Should be interesting times ahead.

Just think: the approximate power of a PDP 11/34 or IBM 4331-1 (Convergent); PDP 11/70 or Prime 550 (Apollo) in the hands of individual users at per station costs of $10K to $30K. Mini makers, beware.

their defense, at the time of formation (August 1979 for CT and February 1980 for Apollo) DOS was unknown, and Unix was little more than Ma Bell's gift to computer scientists.

For both companies life was never the same once the new standards had taken hold. High growth disappeared, forcing painful financial and product transitions. Both morale and image suffered as one founder and then another moved on to different challenges and as leaders recruited from outside brought in new cultures. In the end, acquisition became the only alternative.

There are even parallels in the acquirers. Unisys, the third largest systems company, bought CT to shore up a fragmented distributed systems strategy and serve as a counterweight to the company's proprietary mainframe bias. HP, a mini company in transition, needed firmer footing in the highly competitive workstation world. In both cases, the price was right.

The lessons? That the wrong software choice can foil the best of hardware strategies. And that the difference between a CT of an Apollo versus a Compaq or a Sun is often found as much in the timing as in the execution.

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chock full of neat technology and source-code compatible with the older Domain machines, has not yet achieved widespread acceptance among Apollo's installed base or VARs. HP may integrate the best features of PRISM into Precision, and eventually chuck the husk.

Here's a *Gray Sheet* guess as to what HP's workstation product line will evolve into:

- Low end — HP Intel-based Vectras; HP 68K-based Series 300 diskless machines; for a while, Apollo 68K-based Domain diskless machines.

- Midrange — aggressively priced HP Series 300 machines; Apollo Domains for the installed base; HP PA midrange workstations to attack SPARC and MIPS machines.

- High end — HP PA Series 800 machines for most heavy-duty CAD/CAM/CAE applications (depending on HP's ability to woo VARS); PRISM machines for high-performance graphics, real-time/simulation, AEC, and mapping applications; perhaps an HP PA Plus machine combining the best of both architectures.

Things to Come?

No question, the acquisition will certainly improve both companies' standings in competitive situations with Sun and DEC. Before, HP was the systems company having difficulty catching up, and Apollo was the workstation company in reverse.

But Apollo's long-term customer and VAR relationships, software portfolio, development resources, established U.S. direct sales presence, and networking and multiprocessing technologies should boost HP's drive, while HP's deep pockets should answer any questions the market had about Apollo's viability.

Still, the deal won't destabilize Sun's or DEC's competitive positions. Rapid workstation growth is still probable for both companies, although they won't have Apollo to kick around anymore.

The first of two bigger questions is: How will the combination affect IBM, a perennial so-what in the workstation arena. Although Big Blue is expected to introduce new, and much more competitive, RT computers this year, the current market favorite (Sun) and now two firmly entrenched systems companies (DEC and HP/Apollo) stand in its way. Any IBM movement may have the effect of squashing smaller players before denting the majors.

Which leads to the second question: might the Apollo/HP deal kick off a round of consolidation in the workstation market, perhaps even beyond? The Silicon Graphics and even the Data Generals of the industry can't be looking forward to life beneath a free-for-all among the giants.

The *Gray Sheet* is not trying to suggest possibilities. But off in the distance, IBM's heavy footprints can be felt, if not heard. Big Blue's about to jump into the technical workstation market, and folks may be getting jumpy.

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Sun's New Products: Solid, Not Flashy

Although overshadowed by the HP/Apollo arrangement and, to a lesser extent, news that Bernard Lacroute, Sun's executive VP for internal operations, was resigning, Sun's new product and programming announcements enhance the company's competitive standing considerably.

Sun has been both an implicit and explicit target of numerous product rollouts over the past 18 months, which is to be expected given Sun's successes and penchant for levying potshots of its own at the competition.

The four pieces announced at Sun World, however, will act as effective shields against the most dangerous anti-Sun thrusts from, in particular, DEC, Silicon Graphics (SGI), NeXT, and Apple. Moreover, it anticipates moves from IBM and Compaq. Consider the following:

- The SPARCstation 1 offers diskless price/performance of $715/MIPS, or 12.5MIPS for just under $9K, in a marvelously packaged "pizza box" chassis. As a piece of hardware, it is an effective counter against DEC's new MIPS-based DECstation 3100 machines.

- New software includes the SPARCware Development Kit, comprising tools utilizing OPEN LOOK, Sun's graphical user interface. Sun promises that, through its SPARCware licensing programs, software written using its tools will run on any SPARC machine. In combination with the SPARCstation, the SPARCware concept could germinate into a highly competitive alternative to the Mac, OS/2, and NeXT environments.

- A new graphics subsystem generates impressive graphics price/performance on Sun's Motorola 68K-based and SPARC machines. Given Sun's extensive graphics libraries, the new add-on boards will insure that Sun stays on many short lists despite advances by SGI, HP, Apollo PRISM and Stellar.

- A new family of SPARCserver products will allow Sun to compete for network server business in the office against anticipated products based on Intel's i486 chip. Other SPARCservers are designed with data center-type workloads in mind, but Sun may not be in a position to attack IBM's or DEC's larger customers yet.

Perhaps the most encouraging aspect of this announcement is that Sun has elected to strongly support its existing base of Motorola customers. Although not so prominently featured in the hype, the new 68030-based Sun-3/80 and Sun-3/470 are, from a price and feature standpoint, very competitive, especially at the low end. A diskless, 3MIPS Sun-3/80 sells for about $6K; a diskfull (327MB), 7MIPS Sun-3/470 goes for just under $41K.

The *Gray Sheet* believes it's good business to protect your flank as you go charging up New Technology Hill.

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The I's Have It: Intel Intros i486. Unlike its older siblings, Intel's new 80x86 microprocessor incorporates few new instructions or other significant alterations in architecture. Probably fearful of losing customers to one or the other new RISC alternatives on the market, Intel appears to have designed the i486 with three things in mind: (1) make possible highly efficient 80x86 multiprocessing systems; (2) double, triple, and, for some types of job streams, quadruple performance; (3) don't lower switching costs, even a micron, by forcing software rewrites — make the i486 absolutely, positively, guaranteed 100%-compatible with the 386.

If Intel's performance claims are valid, these design goals have been met. Like Motorola's recently specified 68040, the i860 incorporates on chip cache (8Kb unified), an integrated floating-point unit, and a snoop controller for ensuring cache coherency in multiprocessor configurations.

Unlike Moto's MCPU, which was announced without little details like pricing or availability, Intel's i860 is in beta test and will be available by the end of the year. The 25MHz part to be shipped will generate 15MIPS+ and cost about $950. Systems built on the device, expected to be larger $15K+ server or mid-range-workstation machines, ought to start making appearances by Fall Comdex. IBM, HP, Compaq, and Zenith are among the many publicly promising to deliver i860 systems, with one, Prime, prepared to develop a system built with a 50MIPS ECL version of the chip.

CDC's ETA RIP. Unable to finance six-year-old supercomputer start-up ETA's recurring losses, Control Data has decided to pull the plug. A second-quarter charge of $350 million is expected as a result. Restructuring CDC's Cyber mainframe business and headquarters consolidations will add $120M in charges. In total, the actions will affect 3,100 jobs, half of them in Minnesota. The moves, however, don't get CDC out of the financial woods. It has been unable to secure more than $30 million worth of additional short-term credit, although it's believed to require at least another $100 million.

Big and Fast, but Red, White, and Blue? The SX-X Series of supercomputers from HNSX, the joint venture between NEC and Honeywell, employs a 2.9ns. CPU, Unix, and 64 vector-arithmetic pipeline units to deliver over 20GFLOPS (claimed to be 8X Cray's Y-MP). Other RAS features found normally in mainframes should increase the uptime of the supercomputer. But many commentators continue to question the U.S. sales potential of a machine linked so closely with Japan in a fiercely (perhaps even unreasonably) nationalistic market.

Dep't. of Explication and Amplification. Most of the columns in the Fourth Quarter and Year-End Money Matters issue (the *Gray Sheet*, 24:21, April 7, 1989) were mislabeled. For the fourth quarter figures, the columns should have been, reading across: 4Q88 Revenues, 4Q87 Revenues, Δ%, 4Q88 Earnings, 4Q87 Earnings, Δ%. The same sequence should have applied to the year-end figures as well. We apologize for any inconvenience caused by our slip.

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Fourth Quarter and Year-End Money Matters: Is the Financial Market's IT Distress Warranted?

APR 14 1989
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IBM and Digital warn investors about first quarter results. Unisys lights up the business wire with the news that it expects to report a loss. Lotus sees its stock whacked after making public its intentions to market "Diet 1-2-3 release 3" for DOS. Even the best performing high-tech stocks of the past few years, such as Sun and Microsoft, are being passed among investors like hot potatoes in anticipation of sour financial news. What gives?

Certainly the industry's performance in neither the fourth quarter of 1988 nor last year as a whole doesn't fully justify the financial unrest we are witnessing. The U.S.-based information technology companies followed by the *Gray Sheet's* Money Matters department have continued to benefit from a generally healthy domestic economy, international currency differentials that still favor the dollar, and decent demand for computer and communications products overall.

Nevertheless, more than a few companies are finding themselves behind the eight ball of change, a situation that is sending warning signals out to investors. These signals are being amplified by a lay consensus on two points:

- Many feel that much of the market is saturated with information technology (IT) hype. Confusion, they would claim, is the dominant characteristic of competition today, which will lead to softening demand as customers rein in expenditures prior to reevaluating (or for the first time developing) guiding IT principles.

- Macroeconomic concerns are making investors especially skittish. In particular, many are worried that capital expenditures may shrink in response to expectations of rising interest rates. They conclude that lower capital expenditures will take a bite out of computer-related purchases.

Twelve That Had Fun in 1988	
Amdahl	Microsoft
Ask Computer	Pyramid
Compaq	Sequent
HP	Stratus
Intel	Sun
Mentor Graphics	Tandem

Twelve That Had Less Fun in 1988	
Alliant	Micropolis
Apollo	Miniscribe
Cullinet	NBI
Informix	Prime
Kaypro	Seagate
Lotus	Wyse

Of the two points, it seems to the *Gray Sheet* that the first is the less valid. The market has been dazed and confused for some time, yet demand has remained

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good. Customers are becoming more and more cognizant of what is real and what is nonsense. Don't expect them to curl into fetal positions and start sucking their thumbs because they don't know what IBM is going to do with Unix.

Keynes, Freidman, and Chicken Little

As for the economy at large, the word from economists is that the business cycle may finally be swinging downward. Although last year suffered not an iota despite similar conjectures, most bears qualified their comments with: "Of course, 1988 is an election year."

Few such caveats are being offered this year. Indeed, many of the folks responsible for taking corrective economic action, like Chairman Greenspan of the Federal Reserve Bank, are indicating their intentions to do so. In response to recent blips in the inflation rate, pundits are calling for steps designed to slow the economy — for example, increasing the Fed's discount rate. As we all know, economic prophesies are often self-fulfilling; the tail tends to wag the dog.

History shows, however, that the computer industry is more driven by technology cycles than business cycles (see the *Gray Sheet*, 24:11-12, Dec. 9, 1988). Because the industry is more mature this time around than in 1981-1982, a general economic downturn should produce some negative effect, but new product introductions from mainframe to micro in 1988 and 1989 should help minimize any impact of worsening economic conditions.

IBM's chairman, John Akers, recently told financial analysts that he expects the U.S.-based IT industry once again to grow at three-to-four times the rate of the rest of the economy. Chances are he's right.

How Will the Chips Fall?

Nevertheless, different segments of the computer industry will likely be affected quite differently by an overall worsening of economic conditions. Those most likely to be hit the worst are those that were most blasted in 1988. Similarly, the areas that did best will be the most likely to skate through any difficulties.

Dedicated peripherals companies like Seagate or Micropolis had some of the toughest times in 1988. Their difficulties stemmed from a number of sources: (1) greater margin pressure as powerful buyers like IBM threaten to turn to other suppliers, either competitive or internal, for lower costs; (2) difficulties managing product life cycles and forecasting requisite capacity; and to a lesser extent (3) more competition from nontraditional sources attempting to increase their presence in the OEM channel, as HP is doing.

The net result on the *Gray Sheet's* sample of companies is that this sector saw aggregate earnings for the year drop 63%. Business was so bad in the fourth quarter that the group actually lost money.

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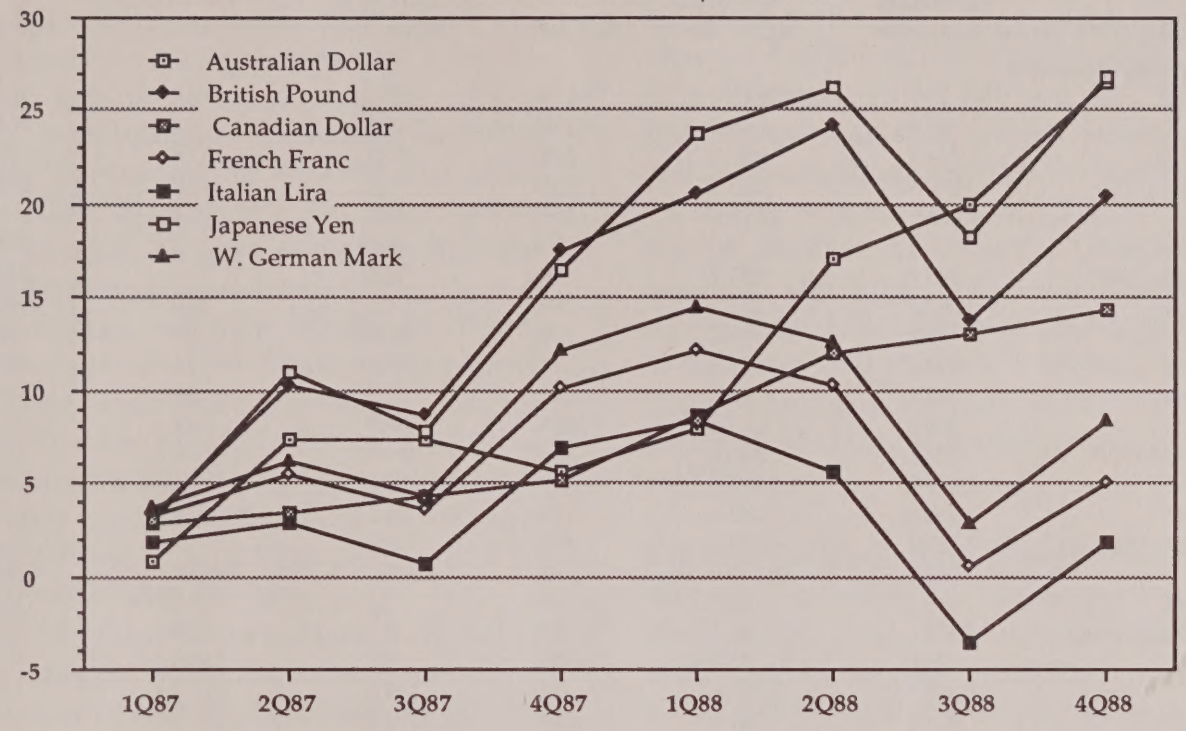
Cumulative Percentage Change in Seven Major Trade Partner Currencies Against the U.S. Dollar Since 1/2/87*

(Source: International Data Corporation, 1989)



*Averages based on weekly Friday closings on the New York market.

On the plus side the independent software and services sector had a respectable year. In 1988 its earnings grew 23% on revenue growth of 15%. And note that this figure doesn't include high flying database companies like Oracle or Relational Technology.

What About International?

Although election year politics stabilized the exchange rates somewhat, fluctuations still benefited U.S.-based companies. It is impossible to forecast with any precision how currency differentials are likely to move in the future, but it is safe to say that at current levels the dollar tends to make U.S. products very attractive on the international market.

Vendors of larger-scale processors and programs have been the largest beneficiaries of the down-and-down dollar, thanks primarily to their excellent international presence. But PC hardware and software companies are striving to improve their distribution capabilities overseas. Many, such as Compaq, expect to exploit new demand opportunities in 1989. Some, like Tandon, are already surviving on their international business.

Consolidation

Paradyne (AT&T), MASSCOMP (Concurrent), Convergent (Unisys), and Computer Consoles (ICL) have all disappeared from our list due to takeover or merger.

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Fourth Quarter 1988 Financials of Selected IT Vendors

(Source: International Data Corporation, 1989)

Category/Company	$Million 4Q88 Rev	$Million 4Q88 Rev	% Change	$Million 4Q88 Rev	$Million 4Q88 Rev	% Change
Computer Systems						
Alliant*	15.7	18.9	-17%	(27.5)	0.4	NA
Altos*	40.4	46.7	-13%	(1.8)	6.3	NA
Amdahl	545.7	482.9	13%	73.0	53.0	38%
Apollo	184.1	163.0	13%	3.2	10.0	-68%
Apple	1,405.1	1,042.4	35%	140.5	121.4	16%
Britton Lee*	8.1	7.0	15%	(0.2)	(7.1)	NA
Commodore*	349.0	281.7	24%	38.2	27.5	39%
Compaq	667.7	432.1	55%	91.9	49.0	88%
Concurrent*	90.7	84.7	7%	(14.8)	0.9	NA
Control Data*	933.0	927.5	1%	(12.8)	10.8	NA
Convex	30.8	20.2	53%	2.2	2.3	-4%
Cray	330.9	163.6	102%	88.5	34.1	160%
Data General	308.6	342.9	-10%	(19.5)	13.8	NA
Digital	3,179.5	2,782.3	14%	279.6	329.5	-15%
Harris*	555.2	492.8	13%	25.2	22.8	11%
Hewlett-Packard*	2,710.0	2,279.0	19%	243.0	218.0	11%
IBM	20,002.0	18,302.0	9%	2,347.0	2,087.0	12%
Kaypro	9.3	22.5	-59%	2.6	(0.6)	NA
MAI Basic Four	107.6	85.2	26%	5.5	5.6	-2%
NBI*	24.1	35.4	-32%	(7.0)	(13.3)	NA
NCR	1,804.2	1,820.1	-1%	149.6	161.4	-7%
Prime*	431.1	267.0	61%	(14.4)	21.3	NA
Pyramid	23.2	15.8	47%	2.6	1.3	100%
Sequent*	24.2	12.1	100%	2.2	1.1	98%
Silicon Graphics	65.9	35.5	86%	2.6	2.7	-3%
Stratus	79.4	55.2	44%	9.2	6.5	41%
Sun Microsystems	448.3	235.1	91%	29.5	14.0	111%
Tandem*	392.3	282.3	39%	31.3	23.7	32%
Tandon	90.3	95.1	-5%	(21.1)	6.3	NA
Tandy	1,402.7	1,302.9	8%	135.1	130.8	3%
Teradata*	34.5	19.4	77%	3.8	3.0	29%
Unisys	2,873.9	2,798.9	3%	218.0	216.9	1%
Wang	760.7	784.7	-3%	1.0	34.1	-97%
Subtotal	39,928.0	35,736.9	12%	3,806.1	3,594.5	6%

**Alliant loss includes $19.9M charge related to company restructuring; Altos 4Q1987 income included $3.1M from sale of Informix investment; Britton Lee 4Q1987 income included $4.6M restructuring charge; Commodore 4Q1987 income included $5.7M tax loss carryforward; Concurrent revenue is pro forma as if the Concurrent-MASSCOMP merger occurred in 1987; income is not, and therefore compares 4Q1988 results only with MASSCOMP in 1987; CDC 4Q1987 income included $5.7M charge; Harris 4Q figures include one month's operating results of GE Solid State, which was acquired 11/30/88; HP for quarter ending 31 January; MAI Basic Four 4Q revenues include sales of various software and services companies acquired during year; NBI 1987 figures restated to reflect discontinued operations; Prime 4Q1988 income includes charge of $45M ($32.9M after tax) for reorganization and fighting MBF unfriendly offer. Prime 1987 figures do not include Computervision; if its revenue were added, Prime's growth would have been 2.1% for the quarter; Sequent 4Q income includes $328K (1988) and $268K (1987) tax credits; Tandem 4Q1987 figures do not include Ungermann-Bass. If its revenue were included, Tandem revenue would have grown 25.4% in 4Q1988; Teradata 4Q1988 income includes $1.3M tax carryforward gain.*

Peripherals and Communications						
Alloy	10.8	10.7	1%	0.0	(0.7)	NA
AST Research*	110.9	92.6	20%	(8.9)	2.0	NA
Cipher Data	53.9	45.4	19%	3.2	2.2	45%
Dataproducts	94.5	91.2	4%	1.6	1.1	50%
Emulex	37.7	30.4	24%	3.8	2.4	62%
Key Tronic	32.3	32.3	0%	0.7	0.7	-6%
Maxtor	91.4	74.1	23%	0.8	5.2	-85%
Micropolis*	80.0	80.4	0%	(15.1)	7.2	NA

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The I's Have It: Intel Intros i486. Unlike its older siblings, Intel's new 80x86 microprocessor incorporates few new instructions or other significant alterations in architecture. Probably fearful of losing customers to one or the other new RISC alternatives on the market, Intel appears to have designed the i486 with three things in mind: (1) make possible highly efficient 80x86 multiprocessing systems; (2) double, triple, and, for some types of job streams, quadruple performance; (3) don't lower switching costs, even a micron, by forcing software rewrites — make the i486 absolutely, positively, guaranteed 100%-compatible with the 386.

If Intel's performance claims are valid, these design goals have been met. Like Motorola's recently specified 68040, the i860 incorporates on chip cache (8Kb unified), an integrated floating-point unit, and a snoop controller for ensuring cache coherency in multiprocessor configurations.

Unlike Moto's MCPU, which was announced without little details like pricing or availability, Intel's i860 is in beta test and will be available by the end of the year. The 25MHz part to be shipped will generate 15MIPS+ and cost about $950. Systems built on the device, expected to be larger $15K+ server or mid-range-workstation machines, ought to start making appearances by Fall Comdex. IBM, HP, Compaq, and Zenith are among the many publicly promising to deliver i860 systems, with one, Prime, prepared to develop a system built with a 50MIPS ECL version of the chip.

CDC's ETA RIP. Unable to finance six-year-old supercomputer start-up ETA's recurring losses, Control Data has decided to pull the plug. A second-quarter charge of $350 million is expected as a result. Restructuring CDC's Cyber mainframe business and headquarters consolidations will add $120M in charges. In total, the actions will affect 3,100 jobs, half of them in Minnesota. The moves, however, don't get CDC out of the financial woods. It has been unable to secure more than $30 million worth of additional short-term credit, although it's believed to require at least another $100 million.

Big and Fast, but Red, White, and Blue? The SX-X Series of supercomputers from HNSX, the joint venture between NEC and Honeywell, employs a 2.9ns. CPU, Unix, and 64 vector-arithmetic pipeline units to deliver over 20GFLOPS (claimed to be 8X Cray's Y-MP). Other RAS features found normally in mainframes should increase the uptime of the supercomputer. But many commentators continue to question the U.S. sales potential of a machine linked so closely with Japan in a fiercely (perhaps even unreasonably) nationalistic market.

Dep't. of Explication and Amplification. Most of the columns in the Fourth Quarter and Year-End Money Matters issue (the *Gray Sheet*, 24:21, April 7, 1989) were mislabeled. For the fourth quarter figures, the columns should have been, reading across: 4Q88 Revenues, 4Q87 Revenues, Δ%, 4Q88 Earnings, 4Q87 Earnings, Δ%. The same sequence should have applied to the year-end figures as well. We apologize for any inconvenience caused by our slip.

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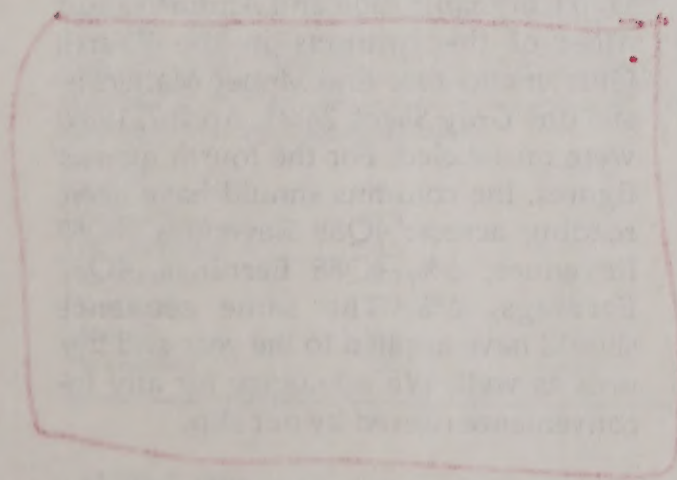

Category/Company	$Million 4Q88 Rev	$Million 4Q88 Rev	% Change	$Million 4Q88 Rev	$Million 4Q88 Rev	% Change
Miniscribe	116.6	116.2	0%	(14.6)	9.0	NA
Network Systems	36.2	35.9	1%	1.4	5.6	-75%
Priam	32.0	34.7	-8%	(4.8)	0.4	NA
Quantum	51.6	56.7	-9%	3.3	5.9	-44%
Rexon	49.4	27.7	78%	5.3	2.8	89%
Seagate	340.3	332.5	2%	7.6	22.8	-67%
StorageTek	266.8	208.2	28%	22.5	6.7	236%
Western Digital	258.4	160.7	61%	12.7	8.3	52%
Wyse*	65.5	128.1	-49%	(26.4)	7.4	NA
Subtotal	1,728.4	1,557.8	11%	(6.9)	89.1	NA

**AST 4Q1988 income includes $5.6M in charges related to planned sale of Camintonn product line ($3M) and workforce cutbacks, etc. ($2.6M); Micropolis figures subject to restatement after new management decision to review results; Wyse 4Q1988 income includes restructuring charge of $4.5M.*

Software/Services/VARs						
Ask Computer	45.5	32.3	41%	3.2	2.3	41%
Ashton-Tate	75.5	62.9	20%	12.8	10.6	21%
ADP	409.5	376.7	9%	805.6	738.0	9%
Boole & Babbage*	17.1	12.3	39%	1.0	0.7	46%
Comdisco*	374.0	327.0	14%	23.0	(56.0)	NA
Computer Assoc.	309.4	195.1	59%	62.7	42.8	47%
Computer Sciences	345.5	287.3	20%	12.0	10.3	16%
Cullinet*	47.1	54.2	-13%	(16.2)	(12.7)	NA
Cybertek	4.8	5.6	-15%	(0.2)	0.3	NA
Daisy Systems	30.9	27.6	12%	2.8	0.5	460%
Data I/O	16.1	16.9	-5%	1.7	(5.6)	NA
EDS	1,274.4	1,153.7	10%	103.4	104.2	-1%
Informix	27.9	22.7	23%	(2.6)	2.6	NA
Intellicorp	5.1	5.0	3%	0.0	(1.0)	NA
Intergraph	214.8	195.3	10%	25.0	24.7	1%
Interleaf*	21.3	17.0	25%	0.1	2.5	-97%
Lotus	112.4	115.6	-3%	9.0	22.9	-61%
Mentor Graphics	83.5	61.4	36%	9.7	6.1	59%
MSA*	59.3	65.7	-10%	(13.4)	(8.7)	NA
Microsoft	209.9	155.9	35%	47.5	35.3	34%
Software Pub.	23.2	14.0	65%	3.8	2.5	50%
Symbolics	16.6	23.8	-30%	0.4	(15.3)	NA
VM Software*	17.8	13.3	34%	3.5	2.7	30%
Subtotal	3,741.6	3,241.5	15%	1,094.8	909.8	20%

**Boole & Babbage 4Q1987 income excluding $3.3M sale of product family; Comdisco 4Q1987 income absorbed $80M loss from discontinued business; Cullinet for quarter ending 31 Jan; 4Q income includes charges of $5.6M (1988/89) and $13.7M (1987/88); Interleaf 4Q1987 income included $830K in tax carryforwards; MSA 4Q loss includes a $4.7 million recasting charge; VM Software 4Q figures restated to reflect merger with The Systems Center, Inc.*

Semiconductors/Components						
AMD*	248.1	262.5	-6%	(34.1)	(2.6)	NA
Chips & Techs.	54.4	32.4	68%	7.9	5.6	41%
Intel	727.3	572.5	27%	85.8	95.5	-10%
LSI Logic*	119.4	78.3	53%	5.3	5.8	-8%
Texas Instruments*	1,692.1	1,534.7	10%	95.3	91.0	5%
VLSI Tech*	64.9	47.0	38%	2.9	1.9	53%
Subtotal	2,906.2	2,527.4	15%	163.1	197.2	-17%

**AMD 4Q1988 income includes $17.3M charge for operation consolidation and $5.1M tax credit; LSI 4Q income includes $859K (1988) and $594K (1987) debt retirement gains and a 1988 $5M writeoff for discontinuing Canadian PC sales; TI 4Q1988 income includes charge of $17M for cost-reduction actions; VLSI Tech experienced a reduction in net income for the fourth quarter of $0.4M as a result of FASB 96.*

TOTAL	48,304.1	43,063.5	12%	5,057.0	4,790.5	6%

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Full Year 1988 Financials of Selected IT Vendors

(Source: International Data Corporation, 1989)

Category/Company	$Million 1988 Rev	$Million 1988 Rev	% Change	$Million 1988 Rev	$Million 1988 Rev	% Change
Computer Systems						
Alliant*	64.8	73.5	-12%	(36.2)	7.1	NA
Altos*	161.1	168.2	-4%	16.0	14.4	11%
Amdahl	1,801.8	1,505.2	20%	223.3	146.0	53%
Apollo	653.5	553.7	18%	2.1	21.2	-90%
Apple	4,434.1	3,041.3	46%	386.4	274.3	41%
Britton Lee	29.6	25.7	15%	(1.1)	(13.6)	NA
Commodore	964.7	815.5	18%	69.6	36.9	89%
Compaq	2,065.6	1,224.1	69%	255.2	136.3	87%
Concurrent*	336.1	346.1	-3%	(41.6)	(5.4)	NA
Control Data*	3,628.3	3,366.5	8%	1.7	19.3	-91%
Convex	105.6	69.6	52%	6.1	9.3	-35%
Cray	756.3	687.3	10%	156.6	147.1	6%
Data General	1,330.5	1,304.0	2%	(47.3)	(84.9)	NA
Digital	12,284.7	10,391.2	18%	1,209.1	1,284.3	-6%
Harris	2,104.8	2,083.8	1%	72.3	124.8	-42%
Hewlett-Packard*	10,349.0	8,629.0	20%	880.0	746.0	18%
IBM	59,681.0	55,256.0	8%	5,806.0	5,258.0	10%
Kaypro	59.0	98.1	-40%	(8.3)	(11.5)	NA
MAI Basic Four	443.2	334.2	33%	24.3	24.8	-2%
NBI*	117.9	156.3	-25%	(47.9)	(17.9)	NA
NCR	5,989.9	5,640.7	6%	439.3	419.3	5%
Prime*	1,594.6	960.9	66%	19.0	64.8	-71%
Pyramid	85.5	57.9	48%	9.5	3.6	166%
Sequent*	76.1	38.5	98%	6.5	4.0	62%
Silicon Graphics	198.5	116.0	71%	10.5	9.1	15%
Stratus	265.3	184.2	44%	29.3	19.4	51%
Sun Microsystems	1,461.6	755.9	93%	89.6	48.0	87%
Tandem*	1,424.7	1,089.6	31%	102.1	101.8	0%
Tandon	309.3	289.1	7%	(19.9)	17.1	NA
Tandy	3,992.3	3,654.7	9%	321.3	289.8	11%
Teradata*	115.0	61.6	87%	14.6	6.9	112%
Unisys	9,902.0	9,712.9	2%	680.6	578.0	18%
Wang	3,074.5	3,047.6	1%	50.2	94.5	-47%
Subtotal	129,860.8	115,738.9	12%	10,679.1	9,773.6	9%

**Alliant loss includes charges relating to restructuring and revenue from Rastor Tech. acquisition; Altos income had extraordinary gains of $5.7M (1988) and $3.1M (1987); Concurrent revenue is pro forma as if the Concurrent-MASSCOMP merger occurred in 1987; income is not, and therefore compares 4Q1988 results only with MASSCOMP in 1987. Also, earlier quarters for Concurrent and MASSCOMP are totaled here, except that "Concurrent" used to report for quarters ending one month after MASSCOMP; hence July "Concurrent" revenue is counted twice but January not at all; CDC 1987 income included $6.7M charge; HP for quarters ending April, July, October, and January; NBI 1987 figures restated to reflect discontinued operations; Prime 1988 income includes charges of $6.2M ($4.5M after tax) for restructuring in conjunction with Computervision merger, $7M ($5.1M after tax) for product withdrawal, and $45M ($32.9M after tax) for organizational realignment and unfriendly tender offer; Sequent income includes $948K (1988) and $959K (1987) tax credits; Tandem 1987 figures do not include Ungermann-Bass. If its revenue were included, Tandem revenue would have grown 17.6% in 1988; Teradata 1988 income includes tax carryforward gains.*

Peripherals and Communications						
Alloy	41.1	44.6	-8%	(2.4)	1.4	NA
AST Research	460.7	289.8	59%	4.3	8.3	-48%
Cipher Data	206.5	172.9	19%	14.6	5.2	179%
Dataproducts	364.1	334.2	9%	(11.4)	(3.2)	NA
Emulex	139.8	112.3	24%	9.2	5.5	66%
Key Tronic	141.1	120.8	17%	(12.0)	3.9	NA
Maxtor	339.0	240.9	41%	9.9	12.5	-21%
Micropolis*	353.1	288.3	22%	(19.4)	27.2	NA

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Category/Company	$Million 1988 Rev	$Million 1988 Rev	% Change	$Million 1988 Rev	$Million 1988 Rev	% Change
Miniscribe	603.2	362.5	66%	25.9	31.1	-17%
Network Systems	131.4	120.5	9%	11.3	17.5	-35%
Priam	142.2	137.1	4%	(2.0)	(4.7)	NA
Quantum	172.5	178.3	-3%	4.1	9.7	-58%
Rexon	176.1	106.9	65%	15.2	10.4	47%
Seagate	1,351.0	1,075.7	26%	(5.5)	117.0	NA
StorageTek*	874.0	750.0	17%	44.2	28.0	58%
Western Digital	972.9	573.1	70%	48.5	47.7	2%
Wyse	488.7	396.2	23%	(6.9)	25.5	NA
Subtotal	6,957.2	5,303.9	31%	127.5	342.9	-63%

**Micropolis figures subject to revision after new management decision to review results; StorageTek 1987 income before $381.3M extraordinary items restated after discussions with SEC; as a result StorageTek can continue to benefit from loss.*

Software/Services/VARs						
Ask Computer	168.3	115.8	45%	12.2	8.4	46%
Ashton-Tate	295.5	254.7	16%	47.1	40.9	15%
ADP	1,616.8	1,467.0	10%	939.9	847.7	11%
Boole & Babbage*	61.4	44.8	37%	3.7	2.4	56%
Comdisco*	1,355.9	1,234.3	10%	95.6	29.9	220%
Computer Assoc.	925.3	648.8	43%	142.4	85.4	67%
Computer Sciences	1,253.4	1,133.8	11%	49.5	40.5	22%
Cullinet*	207.8	213.4	-3%	(42.4)	(30.6)	NA
Cybertek	20.8	23.0	-10%	(0.1)	0.5	NA
Daisy Systems	120.3	103.1	17%	8.7	(14.5)	NA
Data I/O	65.1	66.3	-2%	4.6	(4.3)	NA
EDS	4,817.5	4,393.7	10%	384.1	323.1	19%
Informix	103.5	68.5	51%	1.5	8.9	-84%
Intellicorp	20.9	21.3	-2%	0.6	(4.3)	NA
Intergraph	800.2	641.1	25%	88.0	69.9	26%
Interleaf*	74.9	52.1	44%	2.8	5.2	-46%
Lotus	468.5	395.6	18%	58.9	72.0	-18%
Mentor Graphics	300.8	221.8	36%	33.5	20.3	65%
MSA*	250.0	258.1	-3%	(33.6)	(0.7)	NA
Microsoft	718.6	456.7	57%	151.4	92.9	63%
Software Pub.	82.4	43.9	88%	14.8	6.5	128%
Symbolics	66.5	101.6	-35%	(25.3)	(23.1)	NA
VM Software*	51.7	36.0	44%	7.4	4.0	85%
Subtotal	13,845.9	11,995.2	15%	1,945.2	1,581.1	23%

**Boole & Babbage 1987 income excluding $3.3M sale of product family; Comdisco 1987 income absorbed risk arbitrage discontinuance; Cullinet for quarters ending April, July, October, and January; roughly one-third of Interleaf 1987 income was tax carryforwards; MSA loss for year includes charges of $32.6 million relating to the previously announced recasting of its operations. MSA income figure for 1987 does not include $70.2M charge against previous years; VM Software figures for year restated to reflect merger with The Systems Center, Inc.*

Semiconductors/Components						
AMD*	1,125.9	997.1	13%	19.3	(64.0)	NA
Chips & Techs.	177.9	112.3	58%	25.4	17.9	42%
Intel	2,874.8	1,907.1	51%	452.9	248.1	83%
LSI Logic*	378.9	262.1	45%	24.7	11.3	118%
Texas Instruments*	6,294.8	5,594.5	13%	366.3	321.4	14%
VLSI Tech*	221.2	172.0	29%	6.7	7.1	-6%
Subtotal	11,073.5	9,045.1	22%	895.3	541.8	65%

**AMD 1987 results restated to reflect FASB 96; 1988 income includes $17.3M consolidation charge, 1987 income $41.0M in merger costs; LSI income includes $859K (1988) and $594K (1987) debt retirement gains and a 1988 $5M writeoff; TI 1988 income includes charges of $45M for various special costs, royalties of $124M (compared to $191M in 1987) from DRAM litigation, and $16M from sale of majority interest in a subsidiary; VLSI Tech experienced a reduction in net income for the year of $1.0M as a result of FASB 96.*

TOTAL	**161,856.4**	**142,182.0**	**14%**	**13,690.2**	**12,254.3**	**12%**

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NeXT Adjustment in Channels. Citing "unreal" demand from corporate America for Steve Jobs's new cubic black personal computer, Businessland has confirmed an agreement to purchase at least $100 million worth of NeXT hardware and software. The deal appears almost too good to be true for both parties: to establish credibility among software developers NeXT had to demonstrate viability beyond the limited educational segment it had initially targeted; Businessland needed an upscale product line in the wake of Compaq's decision to cut the retailer off. While both appear to have punched each other's tickets, much work remains before success is assured. Software must be written, Businessland reps must be trained, and corporate America has to transmit its words into $10,000 per machine actions. The *Gray Sheet* is more optimistic, but not yet convinced, about NeXT.

Moto's No-RISC Alternative. Anticipating a 80486 announcement from Intel at Comdex, Motorola has unveiled the next step in the 68K family, the 1.2-million transistor 68040. Motorola claims the 68040 is 100% compatible with previous generations of the 68K, meaning that software written for earlier 68K machines should run unchanged on the 68040. The chip's high density means that Motorola has been able to incorporate technical features heretofore associated primarily with RISC microprocessors, including functions like an integrated 80-bit floating-point processor (compatible with Moto's popular 68882 FPU), extensive use of on-chip data and instruction caches, and a snoop controller for maintaining cache coherency in multiprocessor configurations.

Tandem Puts a Tiger in Its Tank. Ex-Secretary of State George Schultz has been elected to Tandem's board of directors. By placing (er ... taking) his seat on Tandem's board, Schultz brings his ornately decorated pasterier to Tandem's international marketing efforts.

Big Blue 80386. IBM has reportedly begun manufacturing an Intel 80386-compatible microprocessor to be used in the company's more powerful microcomputers. IBM insists that it is merely exercising a long-latent right in its agreements with Intel by acting as its own second source for the chip. The company claims its actions will smooth the flow of its supply, the majority of which will still come from Intel. Intel says its revenue streams will be little affected by IBM's actions.

IBM's S/360 Celebrates 25th. On April 7, 1964, Big Blue unveiled the S/360, one of the most successful families of products of all time. Today, 25 years later, nearly 55,000 of the machines are installed worldwide, from the S/360 model 30 (more than a few originally shipped 6/65 are still in operation) to the 3090 model 600S. An unequivocal congratulations to IBM from the *Gray Sheet*.

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Round and Round NAS Goes. Where It Stops . . . Hitachi/EDS!

After bouncing around the globe for months, it looks as though the National Advanced Systems (NAS) ball, dizzy from numerous odd spins and bad hops, has finally landed where most originally thought it would: in Hitachi's hands. The Japanese S/370 plug-compatible systems (PCM) vendor, together with GM's Electronic Data Systems (EDS) subsidiary, is offering National Semiconductor $398 million for NAS. Hitachi and EDS will initially split ownership 80%/20%.

In taking control of its largest worldwide distributor of PCM CPU, disk, and tape devices, Hitachi is now in much better position to arrange advantageously its channels and after-sales service and support infrastructure. Moreover, EDS's position in the S/370 realm could shore up Hitachi's system software expertise, an area where the Japanese company has felt particularly vulnerable.

At this time the deal is discussed in broad financial and strategic terms. Until finalized (the deadline is April 28), the particulars of the arrangement will remain fuzzy, but some of the issues likely to be hot topics can be induced. Among them:

- Upon taking control of NAS, Hitachi will trade NAS Europe to Comparex, a European distributor of Hitachi's PCM equipment jointly owned by BASF and Siemens, for a share of Comparex reported to be 40%.

- After the transfer of NAS Europe to Comparex, EDS's NAS U.S. stake may be as high as 40%. Expect EDS to be quite active in the remaining U.S. operations of NAS — it may even be charged with choosing the operation's management team. However, EDS will strive to retain its "vendor independent" image. Although this will be a trick, speculation that EDS will suddenly swing the majority of GM's hardware business to Hitachi is, in the *Gray Sheet's* opinion, unfounded.

- The early read is that Hitachi is primarily concerned with increasing coordination among its distributors. Most manufacturing will probably remain in Japan. But company

Quick and Dirty: Effects on Competitors

IBM worldwide position mostly unchanged, except EDS, among IBM's largest customers, in better bargaining position with Big Blue; Fujitsu/Amdahl perhaps forced to make some moves to develop a more unified image worldwide; Mem-Tel challenged to maintain its position as the largest PCM peripherals supplier; non-PCM mainframers likely to see their large-scale business decline even faster as worldwide price and function competition among the leaders heats up.

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names, product names, practices for selling to worldwide accounts, and worldwide service plans may well be adjusted.

- Among the issues that are most important, yet remain most obfuscated, is worldwide development: how well will Hitachi and its partners share technologies as the whole strives to maintain S/370 plug compatibility? This deal brings little, if any, increased hardware expertise to the union. As for software, EDS may be second only to IBM in S/370 system software expertise, but that is its crown jewel. Its willingness to transfer it to other entities around the world remains to be seen.

Overall, the *Gray Sheet* believes the alliance is good for S/370 customers. While maintaining base compatibility, Fujitsu/Amdahl has very successfully forced IBM to respond to a number of important hardware innovations. It could be that the Hitachi/EDS arrangement may help do the same for certain aspects of system software, like network and database management.

A Deal That Almost Wasn't

When late last year National Semiconductor initially indicated that it was looking to unload its troubled S/370 plug-compatible mainframe vendor, most eyes looked to the East. Negotiations between Nat. Semi. and the Hitachi/EDS combine were known to have been in progress. However, what was announced in early January was not a deal including Hitachi, but instead one between Nat. Semi. and Memorex-Telex.

But when Mem-Tel went to its banks to arrange for financing, the *Gray Sheet* believes it was not the deal's price (estimated to be double NAS's independently assessed value) that gave lendors pause, but the fact that NAS had no long-term, comprehensive contract with Hitachi.

The two had been signing specific contracts covering specific products for specific periods of time. Furthermore, speculation had Hitachi and EDS exploring alternate business arrangements that could have included direct competition with NAS. Confronted with these two issues, banks swiftly grounded Mem-Tel's aspirations.

The Wide World of Mainframes

In light of Hitachi's subsequent actions, the banks were probably very wise. The deals Hitachi is making around the globe indicate it is primarily interested in tightening its distribution system to insure that compatibility and global manufacturing efficiencies can be maintained.

Hitachi has long configured its mainframe business on the basis of a global competitive model: centralized development and manufacturing, along with marketing, sales, and support primarily through local, semiautonomous entities. Although coordination among the home office and

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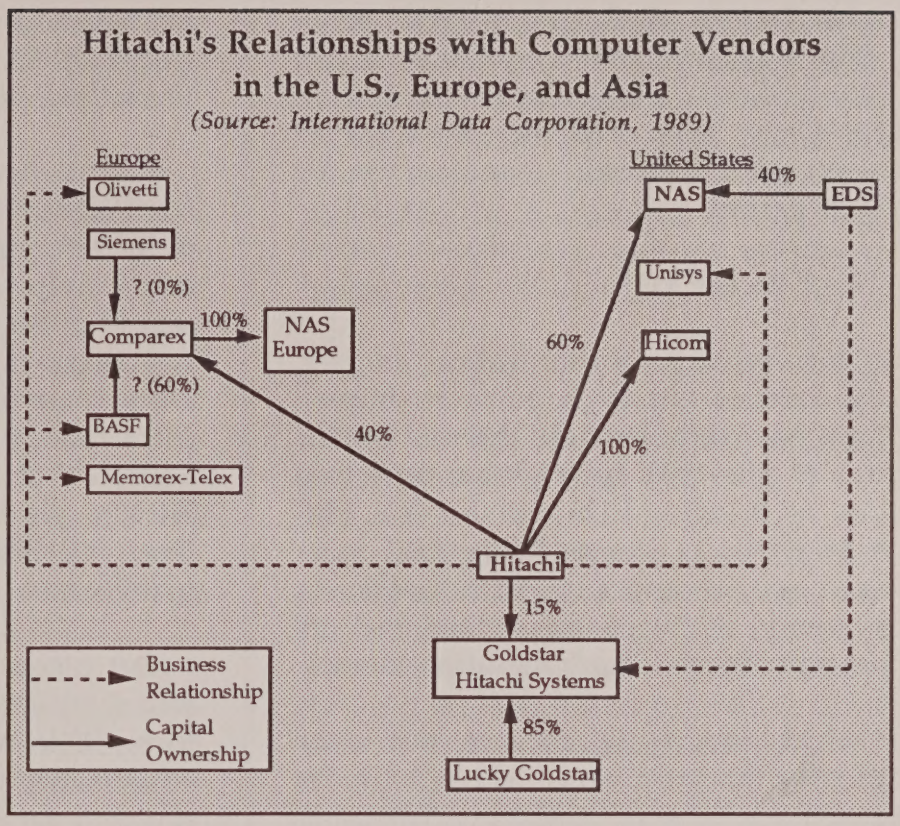
satellites has never been high in this case, nevertheless Hitachi development efforts have always been critically dependent on input from its distributors.

IBM and Fujitsu/Amdahl, on the other hand, have each maintained separate CPU development and manufacturing capacity in both the U.S. and Japanese markets. Presumably, this has allowed Hitachi's competition to rapidly and efficiently respond to the local needs of the world's most committed mainframe customers.



Apparently, though, in the case of NAS, Hitachi felt its competitive standing was suffering. Communication channels for linking Hitachi's and NAS's activities may have broken down, distorted by Nat. Semi.'s semiconductor-biased priorities. Many worldwide began questioning Hitachi's PCM commitment, despite the company's assurances.

Holding an ownership interest in its primary distributors will allow Hitachi to develop and closely monitor these competitive linkages. It should become far more efficient in all mainframe business activities as a result. Which points up two interesting issues:

1. Now that Hitachi has a large (40%) interest in Comparex, how will it treat its two other European distributors, Olivetti and Mem.-Tel.? One way or another, further adjustments in these relationships are likely.

Chances are in both cases that the ties will be weakened. Mem.-Tel.'s relationship with Hitachi is for nothing more than a semiconductor DASD device, something it could source from other suppliers as well. Olivetti claims it will still sell Hitachi equipment in Italy without tighter bonds with Comparex, but its close association with Unix International may mean a shift towards Fujitsu over time.

2. IBM has always tightly coordinated its operations. Now that Hitachi has moved to do so, will it be necessary for Fujitsu to respond in kind to compete efficiently? In Europe, where

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most Fujitsu sales are non-PCM, probably. But probably not in the United States. From a structural standpoint, the *Gray Sheet* believes the Amdahl arrangement remains satisfactory for both parties.

The X Factor: EDS

But while communication is key, capabilities are perhaps more important. And this is where the real potential of Hitachi's new global structure lies. By bringing EDS into the deal, Hitachi perhaps shores up its U.S. software service and support network, its systems software expertise, and its worldwide systems integration talents.

EDS, too, may receive not only greater procurement leverage in its primary U.S. business, but also benefit from Hitachi's worldwide sales and marketing presence.

It all depends on the structure of the final agreement, something expected to be completed by mid-April. EDS could help Hitachi offset any advantages Fujitsu may have gained when it won access to IBM's S/370 system software interfaces (see the *Gray Sheet*, 24:13, December 16, 1988, and 24:17-18, February 21, 1989). It could also give Hitachi worldwide access to innovative, yet compatible, system and data management software programs.

But potential buys you nothing. Realized potential could give birth to a formidable mainframe force. We'll see what transpires.

IBM's Price Hikes Raise Some Warning Flags

The last time IBM bumped prices on its systems was this past July. Except for then recently introduced machines, like the AS/400s, a 9370 or two, a few RTs, and some PS/2s, Big Blue nudged its hardware prices 5% across the board. That action didn't surprise anyone; history shows IBM annually pushing prices by about that much or more (depending on inflation).

But never in the *Gray Sheet's* memory has IBM boosted hardware costs to its customers twice in a year's time, as just occurred. Once again, except for recently announced machines, Armonk has acted to increase hardware prices by 5%. Devoid of any extreme inflationary pressure, this move is very out of character. Something is wrong.

Aha, Armonk also told the street that earnings and revenue forecasts for the quarter and the year are too high by quite a bit. This indicates that the price increase is a reaction to unforeseen difficulties with the top line. A major product is going to ship far below expectations, so IBM is attempting to support its revenue needs by pushing prices on everything.

Is demand for IBM machines softer than Armonk expected? Perhaps, but the *Gray Sheet* doesn't believe slack demand is the culprit. By all indications, worldwide AS/400 demand continues to be spirited, PS/2s are

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shipping at expected volumes, and mainframe customers still intend to take the ESA plunge.

No, the problem instead appears to emanate from the supply side, from somewhere around Endicott, NY, to be exact. IBM apparently has been unable to perfect those logic chips critical to upgrading installed 3090 base and E Models to the new 3090 S Models. New shipments of 3090 S Models, the *Gray Sheet* believes, are unaffected. But upgrade business, which likely generates the greatest proportion of IBM's supremely important high-end business nowadays, has stalled as a result.

Customers that required incremental performance boosts must now either (1) wait for the upgrades to be available, or (2) take delivery on an entirely new machine. If they wait, IBM probably gets nothing for at least well into the next quarter, as the delay is rumored to stretch for another two months.

If IBM's power-hungry mainframe customers opt for a new machine, that could make it more difficult for Armonk to influence the float of E model 3090s on the used market. Big Blue remembers well that used 308Xs chased away sales of new 3090s for years after the newer machines were announced. IBM does not want to contend with the same situation as it looks to roll out Summit, the 3090 follow-on.

The situation could well be exacerbated by the aggressive upgrade terms offered by IBM when the 3090 S models were announced (see the *Gray Sheet*, 24:5, August 27, 1988). Recall that Armonk enacted strong motivators, called "Growth Incentive Options" (GIO), designed to compel near-term, if not immediate, upgrades within the 3090 installed base. If IBM's GIO marketing strategy has been a success, there may be a long line of irate customers stretching around corporate headquarters in Armonk.

Quarterly buying intention research undertaken by IDC's Processor Research Service indicates that upgrade activity is indeed brisk (see page 6).

Four times a year a panel of approximately 500 U.S. S/370 mainframe customers is queried about their hardware purchasing plans and whims looking forward six months. Responses to questions about large-scale, 9370, S/3X, DEC, personal computer, and higher-end peripherals acquisition activities are collected by mail and phone surveys. Data from this panel is factored into IDC's regularly updated shipment forecasts.

A snapshot look at the buying intention data reveals a few interesting points:

- Sixty persent of the planned acquisitions are upgrade shipments.
- The model 200 is a popular entry point into the 3090 family.
- The proportion of new model 600s shipping indicates that IBM's largest customers are buying capacity not incrementally, but in large chunks.

Being unable to satisfy this upgrade demand will impact IBM's software and services revenue in addition to its hardware business.

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Sampling 4Q88-1Q89 IBM Mainframe Buying Intentions in the U.S.

(Source: International Data Corporation, 1989)

3090 Model	120/150/170	180	200	280	300	400	500	600	Total
Upgrade Ships*	0	17	11	2	13	12	3	7	65
New Ships†	10	4	15	3	1	5	1	4	43
% Upgrades	0	81	42	40	93	71	75	64	60

* How many IBM processor upgrades do you plan to acquire during the next six months?

† How many of the following mainframes do you plan to acquire during the next six months?

From the *Gray Sheet's* perspective, IBM's near-term financial shortfall may well be the least of its troubles. More than just its reputation among widows and orphans may be in jeopardy.

Amdahl and NAS/EDS/Hitachi are not likely to revise their ESA development schedules to accommodate IBM's stumbles. Every day that IBM makes a customer stand in line for "S" upgrades is one less day an IBM sales rep can hammer the PCMs on ESA compatibility. The longer the wait, the greater the likelihood that customers will favor a lower-cost PCM solution.

By fumbling upgrades, IBM is losing its greatest advantage in the S/370 mainframe business: time-to-market.

At the very least, the delays could seriously undermine IBM's mainframe introduction schedule. The *Gray Sheet* had been expecting another functional enhancement to the 3090 family prior to the 1990 arrival of Summit. This would have allowed IBM to both further milk its high-end cash cow and gradually take customers one step closer to Summit.

The upgrade hindrance probably means either dropping the kicker or withholding Summit. Either option hurts IBM. If Big Blue retards Summit, other technologies may have enough time to get a toehold on the high-end mountain. If IBM dumps the kicker, incremental revenue is lost, and managing customers' transition to the next family could be more problematic.

At the very worst, these well-publicized problems could nurture any seeds of doubt customers have about the cost-effectiveness of IBM's biggest machines.

Alarmist? Perhaps. IBM says it has the problem fixed and is working to minimize customer inconvenience. And if the upgrades do begin moving soon, customers should be appeased. But with so many adversaries trying to upend Big Blue's mainframe business, the giant can't afford to trip over its own mainframe shoelaces again.

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After a Five-Year, Star-Studded Marriage, Compaq Divorces Businessland

It's been an up-and-down relationship for a while, but few expected it to end so dramatically. Officially unwilling to acquiesce to Businessland's demands for better terms, and probably unhappy with the chain's intention to stress sales of Micro Channel (i.e., IBM) machines, Compaq moved out on the nation's largest computer retailer.

Businessland claimed it needs T&C concessions from its PC suppliers to support its comprehensive service offerings. Compaq refused to grant Businessland points because it feels doing so would give Businessland an unfair advantage over other Compaq retailers. IBM may have agreed to appease Businessland's desires, because it has been reported that the retailer has restructured commission plans to favor IBM sales.

The rift points up a number of issues, among them: Does the retail channel really possess enormous power over PC suppliers? Can PC suppliers effectively transition their channel partners to compete in areas where service is a major concern (see the *Gray Sheet*, 24:18, February 13, 1989)? Are questions of which PC bus is best really important, if not to users, then at least to the folks that supply users?

In many respects the two sides made each other. Commentators used to marvel at the way Compaq catered to Businessland's wants, needs, and desires as the chain battled against vendor attempts to establish vertically aligned retail channels. Businessland, in turn, willingly positioned Compaq as the Cadillac among PC compatibles, an image Compaq was fighting to promulgate.

Now that Compaq has successfully differentiated itself, it seems to feel it possesses enough market presence to go it without the Cadillac of retail chains.

One must wonder, however, what Compaq's future moves will be. One possibility: the Businessland tactic could be construed as a subtle signal to Compaq's remaining reseller channels in anticipation of greater channel adjustments. In anticipation of offering minicomputer-like 80486-based servers and LANs, Compaq may restructure its reseller relationships to encourage coselling and other forms of direct sales and support participation.

Another possibility: Compaq may begin stressing its international business as large users look to consolidate global procurement activities. In this context it is important to note that Compaq has not ended its relationship with Businessland U.K.

Is either firm likely to be permanently damaged by this scuffle? Maybe not, but of the two, Businessland shows the worst short-term scars. Without Compaq it has no 386SX machine, no high-end laptop, no 386 tower. In the PC industry, big deals are won and lost over a matter of months.

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Stratus Drops RISC Bomb. Chalk one up in the Intel i860 RISC microprocessor (MCPU) column. Stratus, among the leading suppliers of hardware fault-tolerant transaction processing solutions, has decided to end its Motorola 88K RISC development work in favor of the Intel RISC platform. Stratus claims that the new systems, when introduced in the early 1990s, will have full software compatibility with the company's present XA2000 systems.

Why did Stratus decide to cease work on Motorola's RISC MCPU, especially since its current products are based on Moto's 68K family? Two possible answers come to mind: (1) a desire to lessen its dependence on one MCPU supplier in the belief that its existing 68K family still has a long life; (2) pressure from IBM, which currently accounts for over 25% of Stratus's shipments and is known to be favorably disposed towards the Intel RISC MCPU.

A Little Suit Among Friends. The judge presiding over Apple's suits against Microsoft and HP for allegedly copying Apple's Mac interface has ruled that Microsoft may have incorporated in Windows 2.03 certain Mac visual displays not covered by its 1985 agreement with Apple. This is a ruling, in effect, on the validity and scope of Microsoft's contract with Apple, and is not directly concerned with whether or not Microsoft and HP have infringed on Apple copyrights. With the contract question answered, the trial will now enter a discovery period on the copyright issue itself. Oh boy!

Plexus Goes Belly-Up. Dumping 75% of its employees and unplugging the hardware side of its business hasn't been enough to keep Plexus from filing Chapter 11. The move came after the innovative maker of image processing solutions was unsuccessful in a bid to secure another round of venture financing.

Adage/Multiflow Agree to Merge. Privately held Multiflow has a reputable name in the tough high-performance systems market, but needs working capital during a time when financial markets are not favorably disposed towards high-tech companies. Publicly-held Adage has a solid cash position on a strong balance sheet, but needs more products to feed a hungry distribution system. 'Tis a match made on paper. Despite the fact that there appears to be no compatibility between their products — Multiflow markets minisupercomputers based on innovative software technology, Adage primarily sells IBM S/370-compatible graphics terminals for CAD/CAM — the fit seems to make strategic sense. Current Multiflow stockholders will receive 60% of the concern's voting stock.

How's-That-Again Dep't. "Standards are decided by stupid people — people with very little foresight." Bruce Bastian, Wordperfect chairman, as quoted in Computerworld Australia, March 10, 1989.

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Unix International: What Advice Will AT&T Get — and Use

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To simplify the enormity of it all, human beings tend to organize the cosmos into simple binary systems. It seems therefore inevitable, especially after last fall's breakdown in negotiations between the Open Software Foundation (OSF) and AT&T, that we should come to witness the enfranchisement of a camp aligned with AT&T, in opposition to OSF.

The consort is called Unix International (UI). It was formed to (1) protect and promote users' and vendors' existing and future investments in AT&T's Unix System V, (2) exert greater influence over the direction of Unix System V, and (3) loudly boo other Unix variants — and their proponents. IBM's AIX, the OSF Unix kernel of choice, is receiving particular attention.

Other than a cozy relationship with AT&T (notice the prominent use of AT&T's well-protected Unix trademark), UI is distinguished by a number of interesting features:

- The seeds of bureaucracy. Like the Corporation for Open Systems (COS), Unix International is a cross between a user group for vendors and a standards body. The organizational structure chosen to perform this hybrid function could engender an indecisive bureaucracy yanked around according to the special interests of its largest members — also like COS.

- Three classes of membership. Principal members annually pay $500K; General members pay $100K; Associate members pay $10K and must be nominated for membership. All members have access to early documentation and source code from AT&T, and can use the UI logo on promotional material. There is no rule prohibiting the same company from being represented by multiple memberships in UI.

- An eclectic membership. What do AT&T, Sun, Fujitsu, Unisys, ICL, NCR, Prime, and Pyramid have in common? Membership in Unix International — and that's about all. There is little strategic homogeneity to this group. Should politicking come to dominate the business of UI, and it may, things could turn ugly, but will most certainly stagnate.

- Strong Japanese representation. With the exception of Hitachi, the major Japanese computer vendors have chosen to side with AT&T. We're not talking casual Japanese interest here; five of the 14 Principal members are Japanese firms.

- No special role for Sun. Only a year ago, AT&T appeared to have decided to place much of its competitive future in Sun's hands. The "Menlo

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Park Ten," a group of five AT&T and five Sun software engineers, had been established to jointly chart the future of Unix. That effort seems now to be deemphasized.

- Blessings from X/Open. UI scored a small PR coup when it agreed to conform with the Common Application Environment (CAE) as specified by X/Open, the granddaddy of Unix standards bodies. The two organizations will work "closely" to ensure source code compatibility between the CAE specification and future versions of Unix System V. The arrangement, however, is not exclusive. X/Open is free to work with any group, including OSF.

One of the biggest points of contention initially raised by disaffected Unix vendors was the linking of the Unix System V standard to AT&T hardware marketing efforts. AT&T has attempted to mollify critics by creating the Unix Software Operation (USO), a business unit separated from AT&T's hardware efforts, to be responsible for all Unix software development.

It is with USO that UI will work most closely; AT&T's hardware operation is theoretically to receive no more special treatment from USO than any other UI member.

Different in More than Just Name

UI shares a number of features with OSF: both groups are not-for-profit; both are outwardly dedicated to encouraging the market's adoption of Unix; consensus building is a chief activity for both; they each espouse openness in their decision making activities; and each possesses a widely diverse membership.

But in many ways UI is more unlike OSF than similar. Whereas OSF is a software development organization charged with writing and licensing software, UI can be viewed as a group that provides, on the one hand, Unix product marketing consulting services to AT&T, and on the other, a ready network for cheaply disseminating AT&T's Unix-related decisions. It will write no code, only advise and comment on AT&T's efforts to enhance Unix System V.

The differences show up most clearly in the structures of the two organizations. To execute its charter, OSF has adopted a form and personality that is reminiscent of a software firm. Appearences can be deceiving, but reporting relationships and responsibilities look to be reasonable and simple. Processes appear streamlined and efficient. Politics and bickering seem not yet to have become a problem, and mechanisms are being instituted to see that they don't.

Toebone Connected to the Jawbone

UI's format is far more complex. It includes not only multiple layers of committees within UI, each potentially numbering scores of individuals maintaining various allegiances, but also at all levels direct ties to companies and

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organizations outside of UI.

In the parlance of software engineering, UI is weakly typed and fraught with nested loops and goto statements. Orthogonality is not one of its outstanding traits. As a result, decision making in UI, reflecting its environment, may be arduous; its decisions may cater to lowest common denominators.

Specifically, there are four levels of committees. The board of directors, comprised of delegates from each UI member, has overall responsibility for establishing UI's strategies. It is not supposed to become embroiled in the day-to-day operations of UI, but will instead meet twice a year to measure the corporation's progress.

Obviously, as UI's membership grows, the board of directors grows. Currently there are over 50 organizations represented in UI. Imagine a commercial enterprise maintaining a board of this size.

Reporting to the board is the Executive Committee (ECom), which is expected to meet once every two months to ensure that UI's operations and employees adhere to charter and budget policies.

Sitting on the ECom are one delegate from each Principal contributor, UI's CEO, and five delegates to be elected from among the remaining General and Associate membership by the Board of Directors. AT&T's USO is also represented by a nonvoting member.

The Steering Committee (SCom), so named because it is actually intended to steer AT&T's USO, will meet biweekly to produce most of UI's actual benefit. It will labor to compile and prioritize a Unix "road map" and "release features list" specifying Unix enhancement schedules. Also, it will release documents detailing Unix requirements and design specifications for members to evaluate prior to general release dates.

Like the ECom, the SCom will include a delegate from each of the Principal members and five from among the rest of the membership. A USO representative and two UI officers will be nonvoting delegates.

The ECom and SCom both currently number at least 19 delegates, already a very large number in the *Gray Sheet's* opinion, but one that could swell further should more Principal members join.

The board of directors will establish Work Groups (WGrps), the fourth primary level of committee, to study in-depth domains it deems important. Due to the practical limitations, no more than five WGrps will likely be convened at any one time.

The *Gray Sheet* believes the five current WGrps are dedicated to examine (1) multiprocessing, (2) working with other standards organizations, (3) online transaction processing, (4) Unix System V licensing T&Cs, and (5) establishing programs to attract independent software vendors.

In addition, UI will encourage the ad hoc formation of Special Interest

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Groups (SIGs). SIGs will play no official role within UI, but will receive administrative support.

The administrative support will be under the direction of four UI officers: a CEO, a director of marketing and promotions, a director of business operations and planning, and a director of technology.

In addition, each WGrp will have a project manager (PM) assigned to it. PMs will report to the technical director and will act as secretary and liaison to USO and other WGrps within UI. All of these positions will be staffed by full-time UI employees. Including paid staff at international locations, the total number of employees on UI's payroll is not expected to exceed 15-20 persons.

Contrast this with the other Unix group. To support its development, marketing, licensing, and politicking activities, OSF's payroll should, by the end of this year, total nearly 160 persons — most of them highly skilled. The *Gray Sheet* estimates that 55% of OSF's staff will be devoted to development, 25% to marketing/strategic relations, 15% to administration, and 5% to managing contact with the research community.

The United Nations of Unix?

As a development organization, OSF will be prey to the adjudications of the market. If things work as they are intended (always a challenge), OSF will survive. If not, it should die.

Assuming success (a *big* if), OSF's customers appear poised to defer core Unix technology decisions to OSF. These firms seem most concerned with assuring that they do not sink a lot of Unix technology and market development dollars into dead-end strategies.

UI was constructed with a radically different philosophy in mind. Discussion and negotiation among suppliers play the critical role at UI. Consensus building is expected to take place prior to any official decision. UI's decision-making process may be slower, but it might be more stable. Which is OK, because its members seem most concerned with assuring that their interests are adequately represented as the Unix standard evolves.

Most of the concerns expressed by the *Gray Sheet* vis-a-vis OSF's formation (see the *Gray Sheet*, 24:2, June 10, 1988) don't apply with the same force to UI because conformance should be less of an issue. AT&T has not stated any plans to adjust its strict conformance licensing criteria.

The *Gray Sheet* believes, however, that in creating a regime geared towards front-loading Unix technology decision making, UI has also created its chief nemesis: itself. The chance is all too real that it will become mired in infighting and petty politics. This concern is founded on a number of points:

• Lack of strategic harmony among UI's membership. Sun wants to do things fast; Unisys wants to transition its installed base; AT&T wants credibility; who knows what the Japanese want. UI's members can negotiate and

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discuss how, when, and where to enhance Unix until they're blue in the face. Actually enhancing Unix will require action, something UI was not structured for.

• Direct participation by members. UI's decision makers are supposed to be senior Unix product representatives on loan from member organizations. They will have to answer not only to each other and the market, but to their bosses as well. Managing these multiple allegiances will be tricky, especially when only their bosses sign paychecks.

For many, UI duty may be regarded at least as an imposition on their time; at worst, should things not go well, it may be viewed as a source of tension and potential embarrassment back at the swillpit. In any event, chances are that while delegates are protecting their company's Unix interests, they will be covering their own fantails as well.

• No simple mechanism for monitoring progress. The market has a wonderful way of thrashing the chaff from the grain. It's brutally simple: if something's worthy, it sells; if it isn't, it doesn't. OSF will experience the market's ringer first-hand. It will get bruised in the process, but it may turn out better product as a result.

UI will have to rely on information from a wide variety of sources to assess its progress. Is USO going to volunteer Unix licensing information critical to its business? What about member firms? Making quality decisions in large committees is tough enough, but making them in large committees without plenty of reliable and credible information at hand is next to impossible.

• No check on any one firm's influence. Nothing precludes a company from "purchasing" multiple memberships. For instance, should a comprehensive systems vendor decide that one delegate cannot concurrently advocate both its mainframe and workstation interests adequately, it may authorize separate divisions to join UI independently of each other. Should this take place, single companies could construct powerful voting blocks on UI's major committees.

• Reliance on AT&T's ability to commercialize UI recommendations. To date, AT&T has not displayed a positive penchant for capitalizing on its wealth of information technology research resources. The company's R&D capabilities seem better suited pursuing telephony problems. But by removing USO from the rest of AT&T's development efforts, perhaps much of Ma Bell's latent software development talent will be liberated.

• Reliance on AT&T's altruism. Of course, much of the compelling need for UI is founded on uncertainty about AT&T's potential use of Unix as a competitive tool. Despite the creation of USO, insofar as Unix is concerned AT&T will absolutely ensure that its technical, marketing, and financial interests are maintained. It, and not UI (see Graybar on next page) retains ultimate authority over Unix System V.

Whither Sun?

Although Unix vendors may still have to pay close intention to AT&T's

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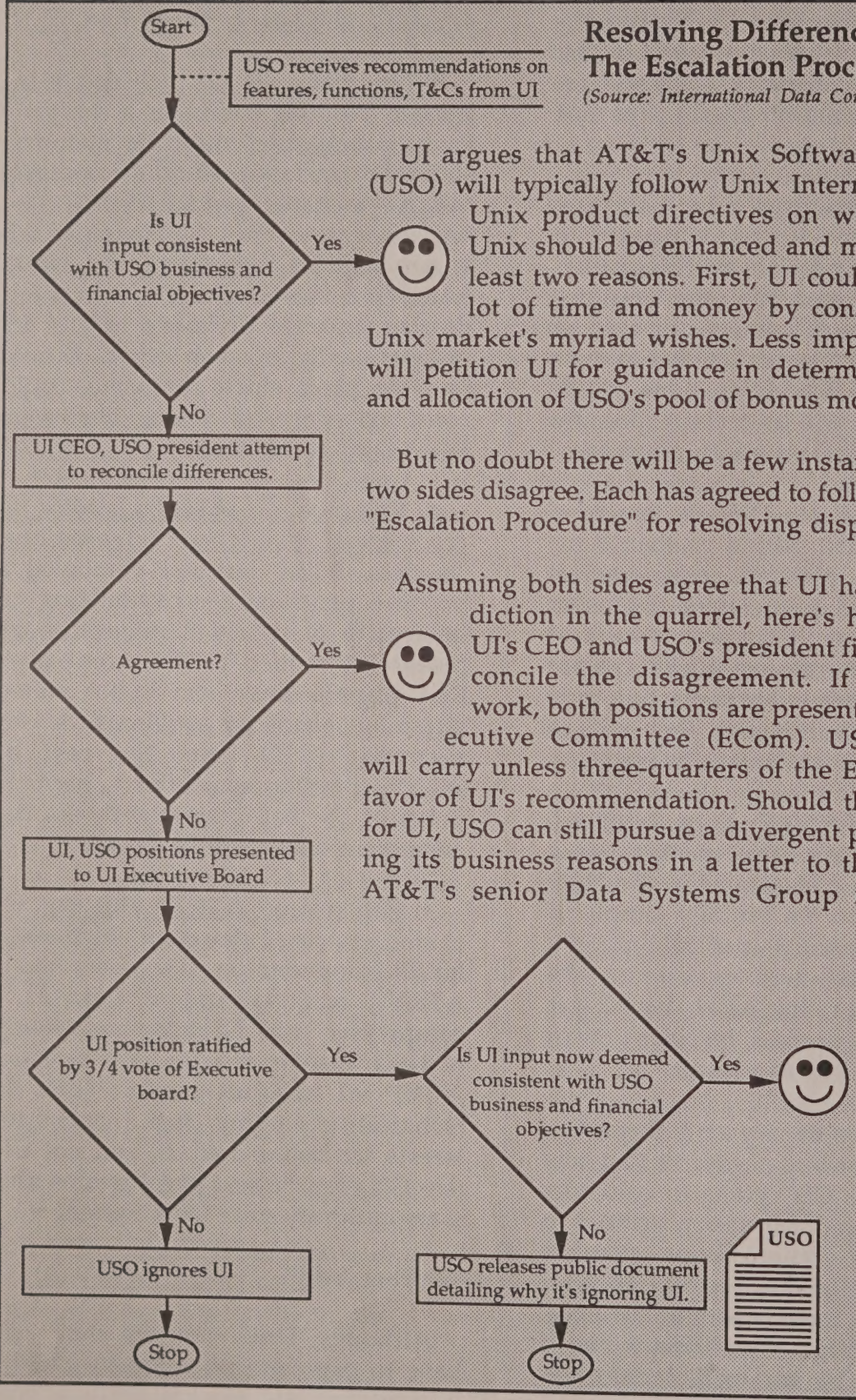
Resolving Differences: The Escalation Procedure

(Source: International Data Corp., 1989)



UI argues that AT&T's Unix Software Operation (USO) will typically follow Unix International's (UI) Unix product directives on when and how Unix should be enhanced and marketed for at least two reasons. First, UI could save USO a lot of time and money by consolidating the Unix market's myriad wishes. Less important, AT&T will petition UI for guidance in determining the size and allocation of USO's pool of bonus money.

But no doubt there will be a few instances when the two sides disagree. Each has agreed to follow a four-step "Escalation Procedure" for resolving disputes.

Assuming both sides agree that UI has some jurisdiction in the quarrel, here's how it works: UI's CEO and USO's president first meet to reconcile the disagreement. If that doesn't work, both positions are presented to UI's Executive Committee (ECom). USO's position will carry unless three-quarters of the ECom votes in favor of UI's recommendation. Should the ECom find for UI, USO can still pursue a divergent path by detailing its business reasons in a letter to the ECom and AT&T's senior Data Systems Group management.

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Unix intentions and actions, the formation of UI has moderated most initial concerns about AT&T's cozy relationship with Sun.

When the two companies first openly talked about jointly developing Unix, they spoke in terms of application binary interfaces (ABI), strict compliance with a comprehensive set of Unix software features, and use of Sun SPARC as the base development platform. Many were concerned that competitive advantage, and not Unix unification, was motivating AT&T and Sun.

Today, AT&T's rhetoric on all three points has been considerably softened. The formation of UI has relegated Sun from being the crown prince to part of AT&T's Unix court. Not a bad spot — certainly better than being one of AT&T's subjects — but probably not the role Sun wanted either.

Sun has indicated to the *Gray Sheet* that it will continue to fight for features that it considers most important, including Open Look.

Bet on a Gradual Convergence

Regardless of what Sun wants, representatives of UI have already stated that if their constituents cry for OSF's Motif graphical end-user interface, then UI will pressure AT&T to wholeheartedly adopt OSF's standard. As standards setting in the Unix market accelerates, this type of behavior will no doubt become more commonplace.

Indeed, the two major Unix positions are more likely to converge over time through a process of each group adopting the market's clear favorites, even if it means licensing technology from the other side, than through a process of contractual negotiation.

In most situations, the old saying that "it's not whether you win or lose, but how you play the game" is pretty much gibberish. But not in the Unix standards confrontation. The issue is not which camp will win, but rather which camp is best organized (how it plays the game) to get the most meaningful work accomplished in the shortest time frame.

It is not clear which side will be most successful at introducing Unix technologies. Entrepreneurial OSF may behave like the run-and-gun Lakers of the early 1980s while AT&T-led UI may behave like the more controlled Celtics. Neither team failed; both won a couple of championships.

Left to its own devices OSF may get more stuff out faster, but UI may be better at enforcing compliance through its front-loaded decision-making process.

But it is not inconceivable that over the next five years UI will be stamping its seal of approval on a lot of OSF efforts, and that OSF will be spending a lot of time courting UI's favor. After all, a standard technology, no matter how smartly it's constructed, isn't a standard unless it's followed.

In any event, customers will have front-row seats from which to evaluate vendors' Unix technology and commitments. Making Unix-related purchase decisions is becoming simpler and far less risky.

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HITACHI/EDS WIN NAS. In a deal reportedly worth $398 million and involving at least eight companies worldwide, National Semiconductor sold its troubled PCM mainframe subsidiary, NAS, to a combination of Hitachi and GM's Electronic Data Systems (EDS). The Nat. Semi./Hitachi/EDS agreement was arranged after it became clear that Memorex/Telex would be unable to favorably finance its earlier commitment to buy half of NAS from Nat. Semi.

FUJITSU DRAM ADVANCES. By employing a 0.2 micron design rule (less than a twentieth of the size of 1MB DRAM cells), Fujitsu has successfully developed the world's first 64MB DRAM parts. Other interesting technologies will allow Fujitsu to pack four times the memory in about two-thirds the space of most experimental 16MB parts. The company anticipates marketing the product in about five years.

NEW CPUs FROM THE BIG TWO. IBM and Digital are among the multiuser vendors that have recently announced new machines. IBM introduced a new 3090, the low-end Model 100 (~5MIPS, $800K), and a new AS/400, the high-end Model 70 (~4MIPS, $310K). IBM also increased the memory capacity of its low-end AS/400 machines and announced a memory sales promotion, addressing a primary criticism of IBM's hot-selling machine.

The DECsystem 3100 is Digital's first multiuser Ultrix system based on the MIPS RISC CPU. The machines were announced at the VAR-rich Uniform trade show after reportedly spending a scant three weeks in development. Prices and performance of the machines range from $20.4K for a 4-user model to $82.4K for a 64-user model.

A THROUGH Z HDTV. The A stands for Ma Bell, the Z for the only remaining American television manufacturer, Zenith. For years its television tenacity in the face of lower-cost Asian manufacturers has been attacked by the financial community as folly, but Zenith may have the last laugh. The two firms plan to develop jointly a high-definition television (HDTV) using base Zenith HDTV technology and AT&T's microelectronics expertise. Zenith claims the sets will be sold for as little as $1,000 by 1993, one quarter the price of what most Japanese commentators are reported to say HDTVs will cost by the late 1990s.

BEATLES ATTACK APPLE'S TUNE. Paul, George, Ringo, and Yoko don't seem to agree on much these days, except to sue Apple for infringing on the name of the Beatles' Apple record company. Seems Apple the computer company in a 1981 copyright agreement promised not to use market electronic music equipment under the Apple name. But it recently introduced five products designed for linking music synthesizers together, compelling Apple the record company to file a multimillion dollar suit and to seek an injunction worldwide to prevent further sales of the equipment. All you need is love and lawyers.

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THE GRAY SHEET
Computer Industry REPORT

PETER L. BURRIS, EDITOR FEBRUARY 21, 1989 • VOL. 24, NO. 17-18 PATRICK J. MCGOVERN, PUBLISHER

Computer Industry Picture Highlights Tension and Change, Especially in PCs

One observation nearly suffices to describe the overall state of the computer industry: Competition is ferocious.

The transition to second generation information systems is causing information technology earthquakes, shaking the industry's structure and threatening to topple more than a few long-time ways of doing business.

Although each system size class faces challenges peculiar to itself, none seems more prone to the shocks than any other. Indeed, because in many applications micros are becoming practical substitutes for mainframes and departmental systems, the problems faced by vendors of different platform sizes are more in common than they are different. Consider the following:

- Customers generally are becoming more savvy, forcibly imposing their interests on vendors. Usually they demand lower-cost standard tools for constucting information systems. Vendors with businesses predicated on proprietary architectures are understandably ill prepared to immediately satisfy these requirements. As a result, many systems vendors talk of integrative, value-added "solution selling," a nice way of describing the competitive tactics required in a market beset by increasing fragmentation.

  (It is interesting to note that not too long ago these roles were reversed: vendors were trying to sell tools — albeit higher-cost tools — while customers wanted solutions.)

- Buyer and channel demographics are in flux. The role of information technology in businesses is receiving a great deal of scrutiny in enterprises worldwide. Two of the major issues are (1) how products and programs should best be purchased and (2) who should be involved in the purchase decision. As all types of customers increase their store of information about standard computing technologies, they will have considerably greater flexibility in choosing suppliers.

- Manufacturing, marketing, and supporting commodity systems implies liberal use of off-the-shelf hardware and software components, while selling value-added systems implies tighter control of the operating environment. Reconciling the incongruities between these two strategic notions is forcing vendors and their partners to rethink competitive plans and assumptions.

- Cost structures and risk profiles are drastically changing in response to the market's standards rumblings. Vendors are building expertise in

IDC INTERNATIONAL DATA CORPORATION
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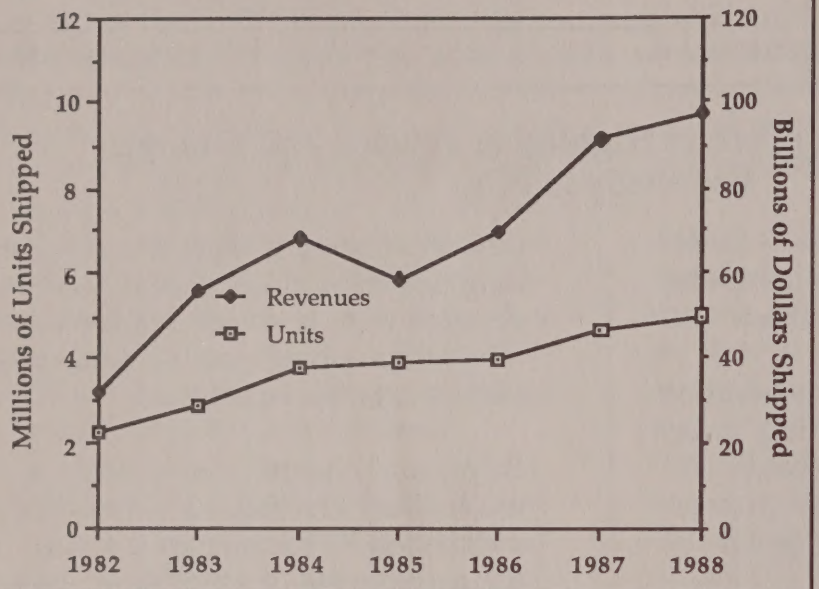
U.S.-based Manufacturers' Computer Systems Units and Value Shipped to the U.S. Market, 1982-1988

(Source: International Data Corporation, 1989)



U.S.-based systems vendors' revenues. By 1987, 41% of the total flowed in from overseas sales.

The dollar's impact was most acutely felt in the multiuser systems sector. In 1982 international demand generated 38% of gross sales. After the dollar's decline in the 1984-1987 time frame, international business, as measured in current dollars, grew about 11%, eventually contributing 46% of the multiuser total during 1987.

domains that are further removed from straight technology than ever before. Partnering, customer support and service, geographic marketing, and competitor analysis capabilities are becoming more important.

The early eighties saw the worldwide computer systems industry grow at a compound annual clip of nearly 21%. Between 1987 and 1992 IDC expects market growth to slow to just over 8%. And again, that's not because one system size class is being hammered. That's because all systems size classes are in for some very rough competitive tremors.

Assisted by fluctuations in exchange rates, the geographic split has also been through some changes. In 1982 international sales accounted for 36% of all

Sensing opportunity, U.S.-based multiuser systems vendors have worked to further penetrate international markets, and, except for Japan, have encountered mostly manageable indigenous resistance.

Just as they are here, organizations headquartered overseas are building information systems on a global scale, and American information technology companies are best positioned to supply integrated worldwide needs. In time, however, more stable worldwide computing standards could improve the competitive positions of non-U.S. computer and communications companies.

Until then, however, there are ample reasons to believe that U.S.-based vendors will continue to enjoy great success beyond our borders.

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The Dynamic Desktop Is Determining Industry Directions

The primary reason the international market looks so good to multiuser systems vendors is that multiuser systems have been looking less attractive to U.S. IT customers.

Instead of investing primarily in tiers of more functional or powerful time-sharing and batch systems, the U.S. market has during this decade been purchasing huge dollar volumes of standard personal computers.

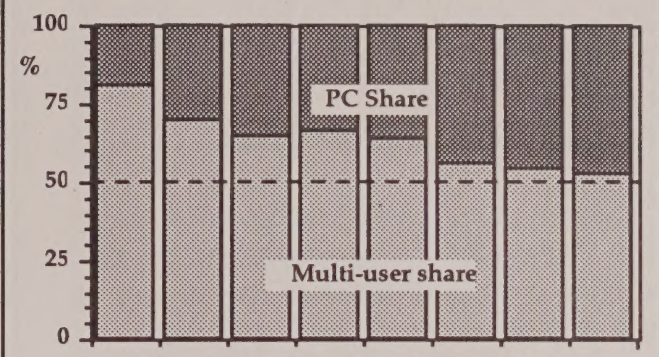
In 1982, one year after IBM's introduction of the IBM PC, personal computer shipment value led by vendors such as Apple, Commodore, and IBM accounted for 19% of shipment value to the U.S. market. Six years later the personal computer was the largest and fastest-growing segment of the U.S. systems market, accounting for 47% of the volume of shipment revenues.

This year IDC expects roughly half of the systems business in the U.S. to accrue directly from sales of personal computers.

These statistics, however, don't reflect the full importance of the PC in enterprisewide systems purchasing decisions, either today or tomorrow. Systems vendors, from PC to mainframe, realize that prosperity in the 1990s hinges on providing cheap, reliable, and standard components and tools for building enterprisewide information networks.

MIS departments everywhere are attempting to satisfy desktop user demands for access to corporatewide computing resources. MIS (or whatever group is making purchase decisions), in turn, has begun evaluating systems suppliers on the basis of their PC connectivity strategies.

Evolving Dominance of the Personal Computer in the U.S. Market, 1982-1992 Shipment Values
(Source: International Data Corporation, 1989)



As a result, PCs are becoming more than just the biggest dollar chunk of the market. They are becoming the driving force behind most industry technology and strategy decisions.

Of course, the most important characteristic of competition in the PC industry is standards, which has two practical implications. First, the remarkable success enjoyed by two or three desktop architectures, and the demise of most others, has led to tremendous competitive fragmentation in the PC market. No clear leader exists to set PC industry directions.

Second, most desktop architectures (Unix being the possible exception) impose severe limitations on personal

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computer capabilities. The requirement of providing secure and reliable processing services that won't be easily fit onto the desktop, either because of physical or administrative constraints, has led to the popularization of the client/server model — a true technology substitute for host-based computing.

Openness Is a Double-Edged Sword

To PC users, standards have made the dream of inexpensive MIPS and shrink-wrapped software a reality on the desktop.

Standards have also made a few vendors fabulously wealthy. Compaq and Sun immediately jump to mind.

But standards have also lowered entrance barriers, mitigated economies of scale associated with vertical integration (indeed, because rapid response to competitor moves is critical, perhaps even resulted in diseconomies of scale), and increased the bargaining power of distribution channels and potentially end-user customers.

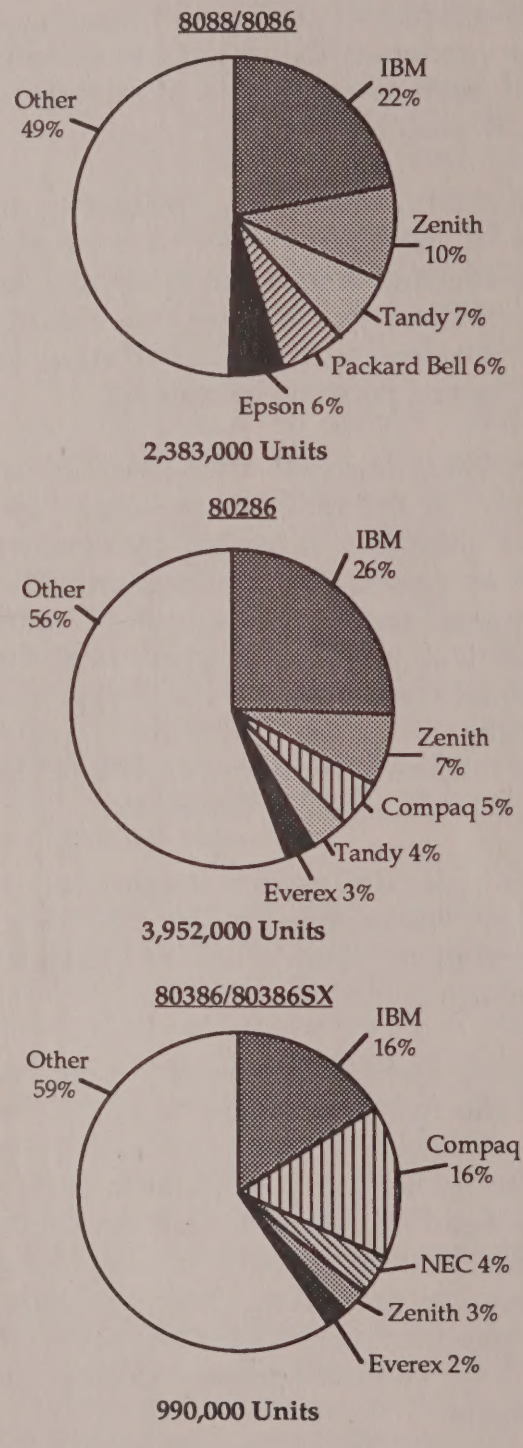
To many vendors, standards could evolve into a nightmare of rampant and fierce price competition, rapid product life cycles, and wildly oscillating market shares.

To better manage life cycles, differentiate their products, and realize any potential manufacturing economies, PC vendors are attempting to enforce rigid segmentations of system configurations.

This practice has helped extend the demand for older 8088/8086 class ma-

IBM PC and Compatible 1988* Shipment Leaders to U.S. Market by Processor

(Source: International Data Corporation, 1989)



*Preliminary estimates. Some figures will receive slight adjustments.

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chines. IDC's preliminary 1988 PC unit shipment figures indicate that a third of all IBM-compatible PCs shipped to the U.S. last year were based on Intel's 808X chip.

But while the costs of assembling and manufacturing units may be lowered by segmenting product families, the practice also requires extraordinary coordination among marketing and manufacturing and often requires larger inventories of components and work in progress. As Apple recently discovered, one miscalculation could have negative effects on an entire company's profitability and, potentially, competitive standing.

Forecasting stronger demand for memory-eating OS/2 than is being realized, Apple, at the height of the DRAM crunch, purchased huge volumes of memory chips to ensure its own supply. Now that the memory shortage appears to be abating, the company is forced to write down more than $25 million in excess inventory — a charge expected to cut this quarter's earnings by 43%. A few are suddenly concerned that Apple's leadership may be having problems managing its tremendous growth.

Apple is not the only PC vendor facing the "problems" of fantastic growth rates. As recent history has shown, industry leaders are subject to wild swings in their market share as aggressive contenders carve out customers.

In 1986 the top four personal computer vendors accounted for 63% of all PC unit shipments to the U.S. market. IBM alone controlled 41% and was regarded as the industry's leader.

By 1988, however, the combined U.S. unit shipment share of the top four had slipped to 40%. IBM had seen its share dive to 23% and its leadership status largely stripped away.

Imagine IBM's mainframe market share dropping 50% in two years.

High among the strategic priorities of a number of systems vendors, especially those selling more than just PCs, is bringing greater stability to the marketplace. Many are pursuing strategies designed to consolidate the industry, thereby removing the some of the major vagaries of fragmentation.

A *Gray Sheet* Segmentale

Want to know about vendors enforcing PC product family segmentations? Try shopping for a new Mac SE 030 with 4MB of memory and a 40MB hard disk.

Recently the *Gray Sheet* determined an upgrade of its desktop publishing system was in order. We figured we needed 4MB of real memory and about 40MB of disk space.

Seems like a reasonable configuration, but does Apple sell it? Yes, but because the 40MB drive machine comes standard with 1MB of memory, if you want it, you have to buy a 3MB memory upgrade. Which in total costs nearly $1,000 more from Apple (and its channel) than the Mac SE 030 4MB memory/80MB disk system. Hmmm.

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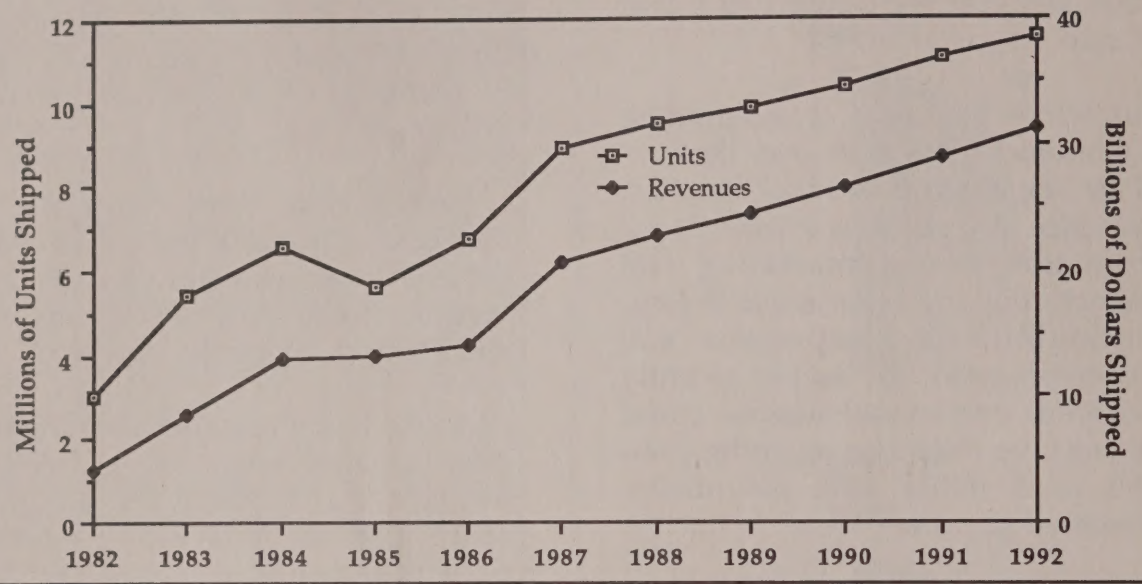
U.S.-based Manufacturers' Personal Computer Units and Value Shipped to the U.S. Market, 1982-1992

(Source: International Data Corporation, 1989)



Not surprisingly, IBM leads the list of vendors hoping to somewhat settle the PC market. In addition to embodying much needed functional improvements in Micro Channel, the new bus architecture also reflects Armonk's desires to raise entrance barriers, improve the potential of scale economies, and return Big Blue to leadership status in the PC industry.

But IBM's undertakings are not solely concerned with the PC industry. The giant has a huge portfolio of products that more and more are dependent on its success with the PS/2.

The Client Is Becoming the Master

In this respect, Armonk is not alone. Every systems vendor, whether traditionally multiuser or PC, is faced with a customer base demanding desktop connectivity.

The IDC Data Dictionary

Personal computers are typically microprocessor-based systems for single users. For microprocessor systems that can support more than one user, IDC bases the distinction between small-scale system and PC on the system's most common configuration. The category includes IBM's entire personal computer family, from the PC to the PS/2, and their competitors, compatible and noncompatible — vendors like Commodore, Apple, and Compaq. It also includes technical workstations from the likes of Apollo, Sun, and Digital.

IBM, DEC, and other host vendors are already in direct competition with Compaq, Apple, and other PC vendors for server business. After the introduction of next-generation microprocossors (e.g., Intel's 80486) PC vendors will

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PERSONAL COMPUTER SYSTEM MARKET — U.S.-BASED MANUFACTURERS*

(Source: International Data Corporation, 1989)

	Number of Systems Shipped	Annual Growth in Shipments	$ Million Value Shipped	Annual Growth in Value
		WORLDWIDE		
1982	3,945,000	NA	5,360	NA
1983	7,191,000	82%	11,305	111%
1984	9,657,000	34%	17,170	52%
1985	8,860,000	-8%	19,070	11%
1986	10,496,000	18%	20,760	9%
1987	**13,030,000**	**24%**	**28,979**	**40%**
1988	13,987,000	7%	32,120	11%
1989	14,695,000	5%	34,985	9%
1990	15,496,000	5%	37,970	9%
1991	16,525,000	7%	41,040	8%
1992	17,375,000	5%	44,265	8%
		UNITED STATES		
1982	3,014,000	NA	4,180	NA
1983	5,416,000	80%	8,715	108%
1984	6,580,000	21%	12,960	49%
1985	5,621,000	-15%	13,320	3%
1986	6,752,000	20%	14,170	6%
1987	**8,918,000**	**32%**	**20,542**	**45%**
1988	9,500,000	7%	22,830	11%
1989	9,825,000	3%	24,440	7%
1990	10,338,000	5%	26,550	9%
1991	11,027,000	7%	28,820	9%
1992	11,560,000	5%	31,160	8%
		INTERNATIONAL		
1982	931,000	NA	1,180	NA
1983	1,775,000	91%	2,590	119%
1984	3,077,000	73%	4,210	63%
1985	3,239,000	5%	5,750	37%
1986	3,744,000	16%	6,590	15%
1987	**4,112,000**	**10%**	**8,437**	**28%**
1988	4,487,000	9%	9,290	10%
1989	4,870,000	9%	10,545	14%
1990	5,158,000	6%	11,420	8%
1991	5,498,000	7%	12,220	7%
1992	5,815,000	6%	13,105	7%

*International manufacturers with U.S.-based sales offices are counted in U.S. totals, but not in international.

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be in an even better technological position.

Traditional minicomputer vendors are at once cautious and made ecstatic by the topsy-turvey turmoil in the PC market. They are cautious because, as standards become more dominant in their markets, they are concerned that "it could happen here." No minicomputer vendor will be able to support traditional business practices should the mini market become structured like the PC industry.

But vendors also sense opportunity. No group has more experience integrating their technology offerings with whatever the customer has installed. Most minicomputer vendors see customers struggling to tie systems together as a potential goldmine.

Who's Taking Charge?

Another major asset held by most minicomputer vendors is their experience selling systems through direct channels. Just because customers begin looking more to networked computer solutions does not mean that they are going to forego strong supplier/customer service and support relationships.

PC players, on the other hand, must create strategies for bringing powerful, flexible, and very functional server-based LANs to market without totally disrupting their channels. After-sales service systems likewise present a significant dilemma. It remains to be seen whether or not Apple and Compaq, among others, can effectively transition their companies and partners to meet emerging market demands.

Three vendors seem to be in the best position to combine experience selling standard machines with knowledge of direct channel sales and high levels of customer support.

Sun Microsystems, the "hot box" workstation vendor, has displayed remarkable proficiency competing in "open systems" markets. But unlike most microcomputer companies, Sun has in place a well-trained and effective direct sales force and support network.

Hewlett-Packard is a minicomputer company with a very loyal installed base, a fair amount of Unix expertise, and greater-than-average knowledge of marketing and integrating personal computers. HP's New Wave MS-DOS/Windows interface for 80286-based machines has already proven to be a strong differentiator in competitive mini bids. American Airlines, a leading DP shop, recently announced that it chose HP to supply tens-of-millions of dollars worth of midscale machines for a new integrated office system application in part because of New Wave.

Finally, there's IBM. Big Blue has occasionally stubbed its toe this decade, but its competitive presence, while not what it once was, still overshadows all others. Armonk's fortunes are very much tied to whether or not it can accept the fact that its days of dictating to the market are waning, and instead rededicate itself to efficiently and rapidly responding to customer needs. If it can, the market may ultimately be compelled, even relieved, to follow.

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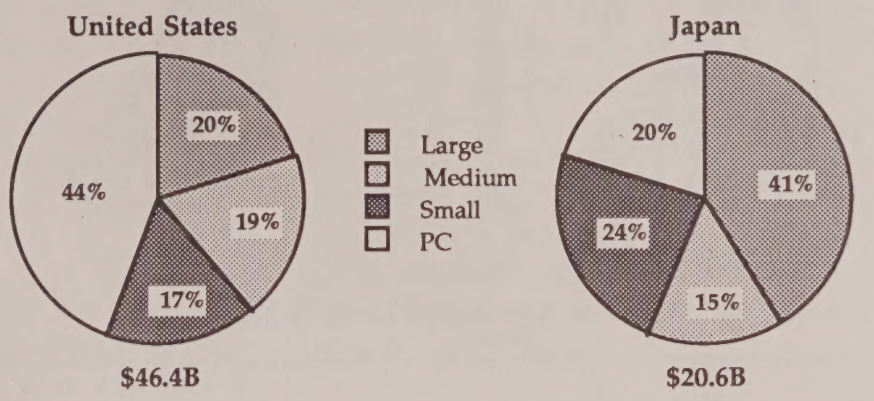
THE STRANGE CASE OF THE MISSING JAPANESE PC MARKET

With Don Bellomy, Director, Processor Research

One of the quiet revolutions in the U.S. PC market over the past couple of years has been the emergence of Japanese vendors as strong secondary players. Manufacturers like Epson, Toshiba, and the NEC clan accounted for about 6% of the American market in 1988, according to preliminary IDC census data.

Value of Domestic Japanese and U.S. Computer Markets by Segment, 1987

(Source: International Data Corporation, 1989)



Of course, you could make a case that the revolution should have begun earlier and have had more of an impact. After all, of all elements of the computer industry, PCs are most similar to the high-quality, high-volume Japanese electronics products that have decimated their U.S. counterparts. And Lord knows, the Japanese have got the DRAMs.

But as fate would have it, PCs are also the aspect of the computer industry in which the Japanese have the least experience. The 20% of the Japanese market that PCs account for is the lowest proportion among major industrialized nations, just as the 41% that mainframes represent is an anomaly in the worldwide computer market.

Put the two together, and you get a white collar workforce still more at home at a computer terminal than a PC, whereas in the United States the number of non-home PCs surpassed terminals installed in 1985, and now account for almost two-thirds of desktop devices.

Why the Lag?

The inversion of market sizes for mainframes and PCs in America and Japan may reflect different economic structures and psychologies. Just as the heavy reliance on mainframes in Japan probably is related to a higher degree of centralization (de facto if not always de jure), the PC may represent the individualism of American corporate workers who want to maintain and manipulate their own data.

But if the Japanese example over the past 120 years proves anything, it demonstrates that national characters

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Department of Explication and Amplification: IBM/Fujitsu Arbitration Resolution

The 29 November 1988 American Arbitration Association (AAA) Opinion which resolved IBM's and Fujitsu's system software dispute is, to say the least, complex and, for the layperson, fraught with deep legal pits.

Unfortunately, devoid of an astute legal guide, the *Gray Sheet* has fallen into a couple of them. We have received word from a number of interested parties that our 16 December 1988 piece on the IBM/Fujitsu resolution has lurking within it three serious inaccuracies.

At this time, the *Gray Sheet* wishes to highlight and remedy these misstatements or misinterpretations of facts. Mr. Jack Jones, one of the arbitrators, has endeavored to help us clarify the offending points. We believe that the main conclusions reached in the story are not materially altered by this new information.

However, our additional study has raised further questions about areas that may have long-term effects on competition in the industry. At a later date the *Gray Sheet* hopes to undertake a more thorough analysis of the overall implications of the Opinions.

There are three points to address.

Issue #1: Can Fujitsu make use of interface information in software targeted to non-Fujitsu operating environments?

The *Gray Sheet* incorrectly implied that Fujitsu has no legal authority to use IBM interface information in software for non-Fujitsu machines. In fact, the scope of Fujitsu's rights includes the right to license software employing properly derived IBM software interfaces.

Issue #2: What software licensing requirements are placed on each of the vendors vis-a-vis the other's hardware?

The *Gray Sheet* incorrectly implied that, according to the Opinion, Fujitsu must license to its customers IBM software. In fact, the Opinion requires Fujitsu to license its system software to IBM hardware customers — a practice it has heretofore refused — and vice-versa. Fujitsu has not refused its customers access to IBM software, as opposed to the statement in the *Gray Sheet*.

Issue #3: Is IBM's Database 2 program on the list of subject software?

The *Gray Sheet* incorrectly stated that Database 2 (DB2) is not included among the IBM programs Fujitsu has access to. In fact, according to the arbitrator's 15 September 1987 Opinion, Fujitsu does have access to DB2.

Our intention with this clarification is to set the record straight. The *Gray Sheet* apologizes to its readers for any confusion caused by our confusion. In the near future we hope, with the help of the AAA, to explore the ramifications of this issue in great detail. As always, your comments are welcome.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR FEBRUARY 6, 1989 • VOL. 24, NO. 15-16 PATRICK J. MCGOVERN, PUBLISHER

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An Open Perspective on 1988: Last Year's Top Ten Stories

Across the land, last year was a year of choice. Many of the major decisions were framed in terms that were more than a bit oxymoronic.

In perhaps the biggest choice made, the Presidential election, both George Bush and Michael Dukakis ran as "elite populists." Bush was the Eastern Republican who made a name for himself as a shrewd, opportunistic, hands-on Texas entrepreneur. Dukakis was the Harvard-educated son of Greek immigrants. Each man promised, if elected, to be not only effective, but competent and caring as well. As we all know, only George Bush will get the chance to maintain his vow.

In the computer industry, a major decision process set in motion last year is similarly colored by apparent contradictions. The transition to the second generation of information systems — one based on the price/performance of standard hardware and software components — picked up considerable steam. It could be viewed as something of a populist enterprise. In the past five years most of its momentum came from quarters other than Armonk, Maynard, and Blue Bell.

The *Gray Sheet's* Top Ten Stories of 1988

1. Nothing Simple About Unix
2. The AS/400: IBM's Model for the 1990s
3. MVS/ESA Gives Mainframes a Purpose
4. Graphical User Interfaces: GUI Games
5. The Mac Attack
6. The DRAM Jam
7. One Tier Starts to Fade: The Client/Server Model
8. Hackers and Viruses and Worms, Oh My!
9. International Outpaces Domestic Demand
10. The BRAT Pack

Yet in 1988 some of the most vociferous support for openness emanated from the elite of the information technology industry. The old East Coast guard — IBM, Digital, Unisys, AT&T — are each stumping to lead the standards movement, either individually or in various collectives. Without their expertise, they claim, "industrial strength" standards will never arise. They promise to bring order to what some perceive as standards chaos without compromising the wishes of users.

The point of departure between George Bush's effect on the Washington scene and IBM's (the most regal of the royalty) on the computer industry

IDC INTERNATIONAL DATA CORPORATION
5 Speen Street / Framingham, MA 01701 / (617) 872-8200

20,000-unit Unix minicomputer contract — not based on AT&T's SVID specification. Digital and Wang took the Air Force to court, but lost. The stark reality that a user as large and as influential as the Federal Government would for major bids begin dictating not only functions but fundamental features as well sent shocks through the industry.

Then came the announcement of a finanicial alliance between AT&T and Sun whereby AT&T could purchase up to 20% of Sun's stock. Sun needed AT&T's cash to fund growth; AT&T needed Sun's expertise to unstick its computer systems business. Executives from both parties heralded the agreement as one destined to redistribute the balance of power in the computer industry.

An earlier AT&T decision to build future versions of Unix System V on SPARC machines now became an even greater cause for alarm. Worried that Sun would ultimately come to enjoy a significant time to market advantage, Hewlett-Packard, Digital, Apollo, and some others appealed to AT&T for assurances that they would receive access and treatment equal to Sun's.

For some AT&T's responses apparently did not suffice. In May, Digital, HP, and Apollo, banded together with IBM, Nixdorf, Groupe Bull, and Seimans to form the Open Software Foundation (OSF). The group is dedicated to sharing the costs and, ultimately, the sales benefits of developing independent of AT&T a common application development and execution environment based on the Unix operating system.

But much of the market felt, and continues to feel, otherwise. Noting that IBM and Digital have the most to gain from perpetuating the status quo, which is based largely on proprietary offerings, many attached sinister intentions to the formation of OSF.

Not the least of those questioning OSF's ultimate purposes has been AT&T. Throughout the summer the two sides negotiated to completely unify the future of Unix. The discussions touched on many issues, some of which were apparently resolved. One, however, became irreconcilable: whose Unix kernel would serve as the foundation for future development work?

AT&T demanded SVID; OSF had committed to IBM's Unix variant, AIX. About as close as they got to a compromise on this issue was OSF's reported willingness to defer the dispute to an open vote of its membership. As the summer faded, so did the two sides' commitment to negotiate. By the time fall arrived, discussions had crashed.

The breakdowns in negotiations compelled each side to commit to competitive paths. A number of companies, including Unisys, Sun, Amdahl, NCR Corp., and the leading Japanese systems vendors, formally aligned themselves with AT&T by creating Unix International (UI).

Unlike OSF, which is a development organization, UI's purpose is to offer guidance to Ma Bell. All development responsibility for Unix System V is retained by AT&T. To better manage

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this work, AT&T reorganized its Unix business into a separate line group within its Data Systems Group.

By the end of the year the word emanating from both camps was that a little competition for defining the Unix platform would be a good thing. Full page ads in the *Wall Street Journal* trumpeting one side's or the other's points of view and successes became regular fare. AT&T's position, for instance, received a boost when the Air Force awarded Ma Bell AFCAC. OSF surprised many by successfully reaching an intelligent decision on its user interface, MOTIF, choosing an amalgam of the HP/Microsoft and Digital proposals.

Both sides face significant challenges in 1989. AT&T and OSF are each committed to delivering major versions of their base Unix offerings. As the two sides battle for credibility in 1989, questions of what, why, and when Unix are being replaced by who.

The AS/400: IBM's Model for the 1990s

The minicomputer may be down, but it can't be counted out. The long-awaited follow-on to the enormously successful S/3X family made plenty of waves in the trade press, but appears to be a big splash where it counts the most — in the market. IBM claimed to have shipped 25,000 worldwide by late November, some four months after first shipment.

Of course, with many of the more than a quarter million S/3Xs installed ready to be upgraded, IBM was fishing in a stocked pond. Nevertheless, despite Digital's assurances that it rarely encounters the advanced object-oriented midrange system in competitive bids, IBM insists that nearly 40% of AS/400s shipped were into new accounts. By any measure, the AS/400 appears to be a hit.

The reasons for its immediate success are many and varied, but three stand out: customer loyalty, applications software, and new competitive systems designed to take full advantage of IBM's strengths.

Customer loyalty. IBM's reputation for service and support is among the finest in any industry. But perhaps nowhere are IBM's customers more loyal than among its S/3X installed base. In historically the most competitive segment of the systems business, the midrange, S/3X customers show an amazing propensity to stick with IBM's S/3X solutions. Poor absolute performance, dear pricing, and constant concerns that the S/3X doesn't enjoy the same level of internal IBM commitment as the S/370 family are discounted by users. Instead, the machine's ease-of-use, connectivity, and huge application software portfolio are deemed more important.

The AS/400 successfully deflates the main S/3X weaknesses (price/performance of the family is much improved, and establishing of a line of business entirely devoted to selling S/3X machines removes any doubts about the machine's future), while inflating the strengths (the AS/400 combines the best bits of the S/36 and S/38). Because migration to the new systems is reasonably judicious (especially for

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topped-out 38s), the apparent result is many sites looking to upgrade.

Applications software. Concomitant with the introduction of the AS/400, IBM announced that more than 1,500 software applications from both IBM and third parties were ready to be marketed for the machines. By August this figure had risen to over 2,500.

Much of the software is simple rewrites. But a few of the applications written expressly for the AS/400 are causing quite a stir and point the way for future development efforts. For instance, MAPICS/DB, IBM's MRP program for the AS/400, makes outstanding use of the machine's integrated relational database, connectivity, training, and support facilities.

New competitive systems. To help penetrate new customer accounts — particularly small business sites — IBM introduced some "customer-friendly" packaging, pricing, training, support, and financing arrangements. Of particular interest are the financing programs IBM set up through its IBM Credit Corporation (ICC) subsidiary. Not only can customers buy AS/400s under favorable credit terms, but IBM is making ICC's financial resources available to its indirect sales channel. Value-added resellers and other third parties can arrange for customer financing through ICC just as IBM sales reps can.

In an attempt to generate AS/400 manufacturing efficiencies, IBM is encouraging customers to purchase certain configurations by offering bundled options at a considerable discount to its piecemeal pricing schedule.

As we look forward to 1989, IBM must improve the AS/400's price/performance at the low end and its peripherals options (in particular, a high performance streaming tape drive) at the high-end. Certainly Big Blue won't be quiet on this front. Last June it promised regular six-month functional or price/performance enhancements to Silverlake.

As for beyond 1989, the AS/400 may offer some clues about how IBM would like to compete in the next decade. The nontechnical capabilities IBM is stressing with the AS/400, and presumably will further accent, are financing, indirect channel relations, and automated support and service. It is likely that in the future these resources will play a larger role throughout Big Blue.

MVS/ESA Gives Mainframes a Purpose

How much is 16 terabytes of data? Who knows? But customers of IBM's 3090 E and S models can find out by fully exploiting the resources of IBM's new mainframe operating system, MVS/ESA.

Actually, ESA is more than operating system software. It is a new S/370 architecture — Enterprise Systems Architecture — comprising a number of features. IBM has taken great pains to assure its VM customers, especially midrange customers looking at purchasing 9370s, that they too will be able to take advantage of the advanced functions found in ESA.

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Perhaps the most important new feature of ESA is Systems Managed Storage (SMS). Ambitious enhancements to the Data Facility Product (DFP) family (the integrated set of utilities for managing, moving, sorting, and securing physical data outboard of the processor) bring IBM's large systems customers much closer to the dream of highly automated mainframe operations.

That will be absolutely critical in operating environments characterized by terabytes of data, such as will be found in image processing or "artificial intelligence" applications. Working with data volumes of this size will be greatly facilitated by a new logical data storage construct called "hiperspaces," — high-performance data spaces. Under ESA, a hiperspace can be up to 16 terabytes in size.

Obviously, not all of the hiperspace can reside in central storage at once. The primary existing constraint is that because IBM's mainframe processors are still based on 31-bit virtual addressing, only 2GB of data can be virtually addressed at any one time.

To circumvent this problem, IBM introduced "data windowing." With this facility the processor establishes a virtually addressable window within the hiperspace. The 3090 E and S models include new hardware and licensed microcode to support efficient management of data windows.

This implies that the number one challenge facing IBM's PCM competition is: how to replicate the function of data windowing without knowing what are the new memory management techniques.

Both Amdahl and NAS have promised to deliver ESA support by year-end 1989, but questions associated with accomplishing this are at least partially responsible for huge troubles at one of the two. While Amdahl continues to thrive despite ESA, NAS has been battered in the field and on the business pages as a result of questions about future compatibility.

So problematic were NAS's difficulties that National Semi, NAS's parent company, shopped for and found a partner to help run the company. Memorex Telex, a closely held PCM peripherals manufacturer, has agreed to take on 50% of NAS's potential and problems. Memorex Telex holds options to purchase more of NAS over time.

That should help assuage customer concerns about ailing NAS. However, if the questions asked instead derive from concerns about compatibility, the anticipated 1990 arrival of Summit, IBM's next generation mainframe, will only serve to compound potential PCM difficulties.

Summit will probably incorporate additional gizmos to support high-volume transaction processing that requires absolute assurances of availability and the integrity of huge amounts of data. Just about the time the PCMs master ESA, Summit may appear and force them back into catch-up mode.

Graphical User Interfaces: GUI Games

A zillion areas in the computer

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industry could be standardized. Relational database, networking, high-level languages — each is among the critically important technologies for the future. But in 1988 the area receiving the most attention may be the most important: end-user interface.

The preeminence of the end-user interface is based on two simple factors: (1) users balk at learning many interface routines, and (2) software developers don't have the resources to develop programs for a wide variety of interface specifications.

The tremendous costs of training people to use, developing for, and supporting a wide variety of applications interfaces is forcing both users and independent software vendors to choose from among dozens of credible interface specs. The leading interface technologies, however, have two things in common.

Leading the list is graphics. Cheap, powerful desktop MIPS are being devoted to managing visually rich bitmapped screen systems. The semantics and syntax of these systems are based on visual cues. Color, buttons, scroll bars, and icons assist the user in effecting actions and navigating the system. Character-based dialogue will retain some importance, but mainly for certain types of work, like data entry.

The second feature generally shared by leading interface candidates is windowing. Among the various available windowing technologies it appears that MIT's X.11 specification is the most popular among systems vendors because it eminated from an independent source and supports networked applications.

The interface question is so important that it compelled Apple to sue HP and Microsoft. New Wave/Windows, Apple maintains, illegally incorporates a few of Apple's Macintosh interface patents. The suit initially caused some concern among software developers, but, although it is still pending, today seems to be largely discounted.

End-user interfaces will continue to be a hot topic in 1989. OSF has just announced its interface choice. Called MOTIF, OSF's product will be a combination of HP/Microsoft and Digital technologies. A 3Q89 delivery is promised. DECwindows got a boost from OSF's choice because MOTIF will use the DECwindows toolkit. Presentation Manager, the GUI specification for OS/2, has been available since last Halloween, but has received only a lukewarm reception. OpenLook, the Sun/AT&T GUI for Unix System V.4, is also expected to be out later this year.

The Mac Attack

No longer is the Mac viewed as a computer for kids or executives wanting to play flight simulator games. An expanding base of high-quality business and desktop publishing applications software, a consistent and productive graphical end-user interface, and general confusion in the IBM PC-compatible realm all contributed to the Mac's rapid penetration of corporate America.

So successful has Apple been with the Mac that at the end of 1987, on the

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basis of IDC shipment value research, it was the third largest supplier of computer systems to the U.S. market (following IBM and Digital).

However, all's not wonderful with the Apple or the Mac. Three major challenges face Apple in the coming 18 months. First, Apple's suit against HP and Microsoft for alleged violations of Mac interface patents is viewed by many as frivolous and could turn into a PR nightmare for Apple.

Second, the company has no discernable server strategy. Whereas most other PC companies are in position to develop and market server products in the future, Apple seems much less prepared for the evolving client/server world. Instead, it seems willing to lean on alliances with minicomputer companies like Digital, Tandem, and DG for the server function. The *Gray Sheet* believes Apple must swiftly address this shortcoming.

Finally, the Mac is highly proprietary. Assuming the rest of the world evolves to open standards, Apple's distinguishing interface will come under greater attack from less-proprietary solutions. Should the workstation market rapidly adopt the price/performance possibilities of RISC/Unix, the Motorola 68K-based Mac could find itself lagging even worse.

The DRAM Jam

At bottom, economics is pretty simple stuff. Prices fluctuate as the demand for and the supply of goods changes. When demand goes up and supply goes down, prices rise.

The factors influencing changes in demand and supply, however, can be extremely complex and difficult to analyze. Certain markets are especially sensitive to adjustments in the political, economic, or technological environments. Sometimes, especially when these markets are very capital intensive, suppliers and buyers can see their strategies and bottom lines take severe and protracted beatings.

The U.S. semiconductor market is one such industry. It is also an industry whose good health many believe is critical to the economic and the national security interests of the U.S.

But because it's beset by rapid and expensive changes in its technology base (chip fabs can require as much as $100 million dollars in sunk costs and may have a useful life of only two-to-three years) and heated competition from lower-cost Asian producers, it's been feeling a bit green lately.

In the past few years the challenges facing the U.S. semiconductor have been no more evident than in the dynamic random access memory (DRAM) market. U.S. manufacturers have seen their market shares steadily declining under the onslaught of Japanese chip makers. Claiming unfair competitive practices were behind Japan's successes, the U.S. Semiconductor Industry Association enlisted Congress's aid in negotiating an agreement to regulate Japanese competitive practices here.

While that resulted in vituperative headlines, a technology changeover from 256Kb to 1Mb DRAM parts led to

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severe memory shortages last year. At one point 1Mb components reached spot market prices of over $35, more than four times what some have estimated DRAMs would cost absent the artificial constraints.

Computer systems and peripherals vendors collectively consumed nearly 50% of the world's DRAM supply in 1988. The shortage, therefore, had a particularly acute effect on the computer industry. Nearly all vendors were forced to make adjustments to their product pricing and availability schedules to accommodate the shortfalls in memory component production.

The problem is expected to abate in 1989. In-Stat anticipates worldwide shipments of 1Mb parts to reach nearly 500 million units next year and be sold at an average price of about $8.50 apiece. Sixty-one percent of these chips are expected to be purchased by computer vendors.

That the DRAM crunch is fading is good news to all. While fast-growth companies have been unable to fill orders because of DRAM availability limitations, slower-growth companies have seen their margins negatively impacted by exorbitant memory prices. The computer industry would rather invest its time and money in pursuit of ends other than memory components.

One Tier Starts to Fade: The Client/ Server Model

A chicken in every pot, a TV in every home, and a minicomputer in every office.

Ah yes, the old measures of prosperity. Today the chickens are precooked and frozen for your microwave convenience; the TV has given way to the home entertainment system; and in many offices the minicomputer is being replaced by the PC LAN.

Two years ago, the only vendor voices not spouting the virtues of the three-tier architecture — mainframes for corporate, minis for departmental, micros for desktop — were PC types. Minicomputers, most said, would facilitate MIS's assimilation of the desktop. MIS, the argument went, understood minis, not as well as mainframes, but far better than PCs.

Suddenly, however, leading MIS shops have been doing an about face. Instead of blindly heeding the soothing minicomputer tunes being whistled by midrange suppliers, MIS has begun to actively distribute control of the system, and responsibility for service levels, out to the end user. The vehicle for doing this is the server.

For those that couldn't resist the sirens of the midrange, well, the three-tier architecture might be their swan song. The server offers a lower-cost combination of hardware and software than most current minicomputers, without great sacrifices in performance. Using standard chips and peripherals, powerful systems configured with hundreds of megabytes of disk storage can be purchased through a variety of channels, often for much less than $25,000.

The real savings, however, may stem from lower software costs. By

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running data and communications management software on the server and application logic on the desktop, users can deploy software functions with $/MIPS in mind. The market still seems loath to pay more than the cost of the hardware for application software — no matter how good it is.

That's not to say minicomputers, or mainframes for that matter, won't play the server role. They are expected to. But from an architectural standpoint the old notion of a hierarchical network model dominated by either the mainframe (if you were talking to IBM) or the minicomputer (if you were talking to Digital) is losing credibility.

Still, 1988 wasn't the year of the LAN (anymore than was '87, '86, '85) because the skills required to manage these types of systems remain in short supply. As the PC industry prepares to roll out server systems built with Intel's 80486 microprocessor, it faces significant challenges in areas such as reliability, data integrity, and ease-of-use.

Hackers and Viruses and Worms, Oh My!

Last November, a tiny little window in Unix's electronic mail services was just big enough for an ugly 5,000-line message placed on Arpanet to surreptitiously gain entrance into unsuspecting Unix sites. The disastrous results made headlines everywhere and may prompt a series of Congressional investigations.

Across the nation research facilities discovered their computer systems under attack by a "worm" that maliciously overran their machines. Worms are pieces of code that replicate themselves ad infinitum by disrupting an operating system's supervisor facilities and/or memory management routines. Under normal circumstances, an operating system will freeze a job, store the machine state, and, after repeating the cycle with other pieces of work, restore the job state so that it can continue to execute. Worms are constructed to override this process.

The incident touched off a debate centering on two questions: (1) How secure are computer networks, but especially Unix networks? and (2) Is hacking, the "sport" of programming for the thrill of it, villainy or a forgivable rite of passage for America's computer technologists?

The first is a market question, and one that has already become a part of more than a few marketing messages. At Digital's desktop announcement earlier this month, for instance, Ken Olsen specifically referenced the Arpanet disaster as cause for Unix pause.

Leading Unix vendors have been rushing to incorporate security extensions into their Unix offerings to preempt further concerns from users, especially government users. AT&T has made a point of placing security at the top of its System V.4.1 (the release subsequent to the coming release) requirements list.

Some claim that there isn't a security problem inherent to Unix, just a problem in how Unix's integrated security facilities are employed. Because many Unix users are very conscious of

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machine efficiency, and because security functions generate machine overhead, security modules are often not exploited. Another problem is that Unix's documentation is so difficult to read many don't even know how to exploit existing security functions.

The second question is part of an ethical question touching on far larger issues that can't be covered here. Suffice to say for the moment, however, that the young man allegedly responsible for last November's escapade is expected to stand trial for computer-related crime, not sport.

International Outpaces Domestic Demand

During the past few years, the dollar has been the U.S. computer industry's best friend. The fall of our nation's currency relative to the legal tender of other nations gave rise to tremendous international revenue growth for U.S.-based IT vendors.

Exchange rate differentials made U.S. computer products cheap in comparison to indigenous equipment or that supplied by non-U.S. vendors. By taking orders in local currency, U.S. companies were able to either discount their products more freely and move greater volume (in price-sensitive situations), or extract a bloated margin from the sale by charging prices equivalent to the competition (in feature/function situations). Either way, the international bottom line fattened considerably.

Although the dollar was not so active last year (1988 being an election year and the incumbent administration wishing to avoid any economic pratfalls), nevertheless a preliminary analysis of industry financials by IDC analysts reveals that once again, international outpaced domestic sales growth.

The reasons for this deserve a detailed treatment, but a cursory analysis reveals a few key points:

Post-election slip. Almost immediately after Mike Dukakis completed his concession speech the dollar took a dive. This combined with heavy seasonal sales activity improved fourth quarter international revenue figures.

Stronger overall international demand. It appears that the international pie is expanding faster than its domestic counterpart.

Supply creates its own demand. U.S.-based vendors have been flocking to the international marketplace ever since the dollar began its descent. They expanded direct and indirect channel presences, support and service infrastructures, and their commitment to native language software to take advantage of the impending international bonanza. None of this disappeared because the dollar became more stable. In 1988 U.S.-based IT players continued to exploit these capabilities with great success.

The short-term effect of the weaker dollar was to improve the country's balance of trade situation. A noble cause, but the long-term effect could prove even more worthy. If the opportunities created by the dollar's oscilla-

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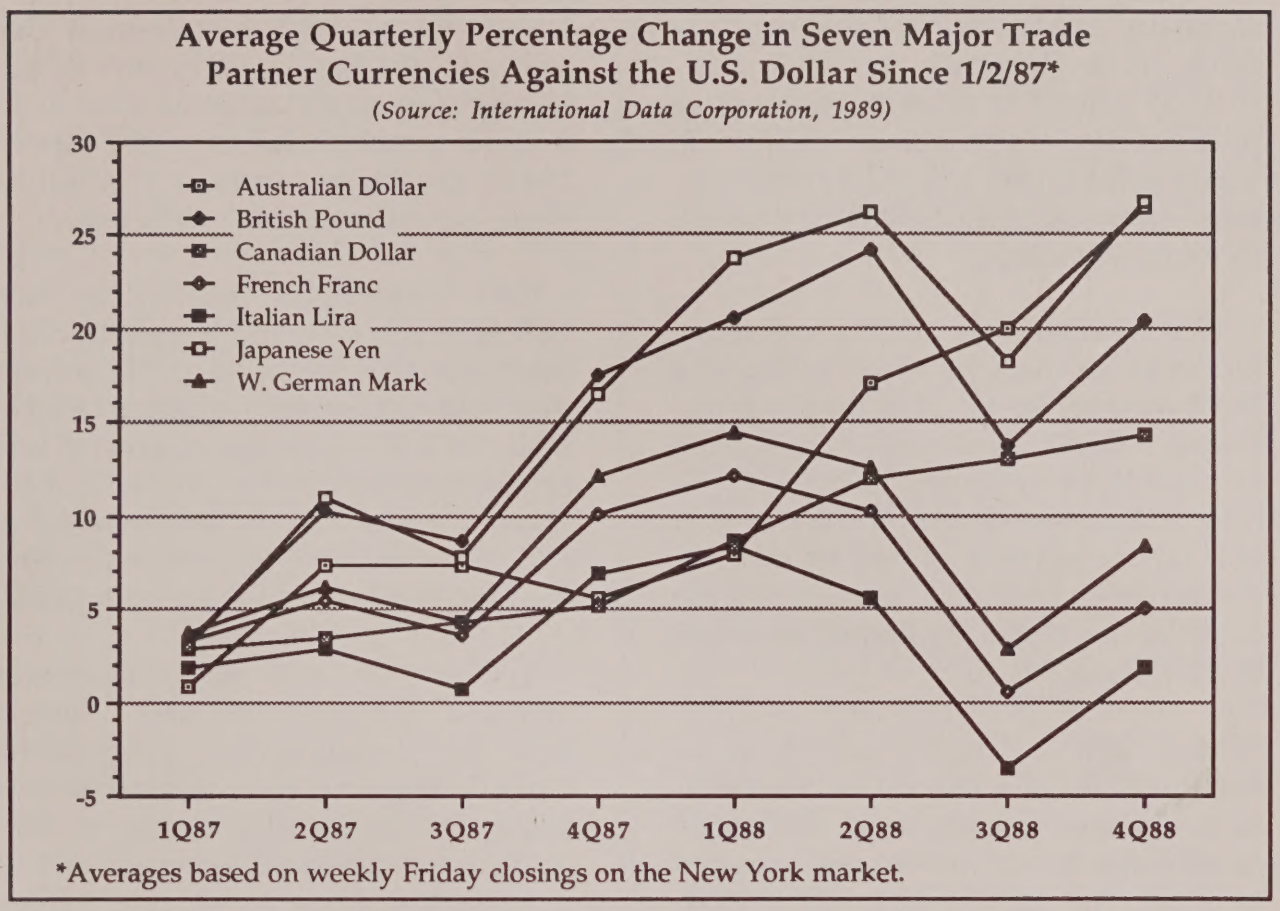

tions compelled U.S. manufacturers to improve their long-term competitiveness overseas, then so long as the dollar does not skyrocket, there is every reason to believe that these competitive systems will continue to reap rewards.

The BRAT Pack

Another way of looking at this story is, "IBM's Micro Channel ain't an instant success."

Nearly two years after IBM initially introduced the world to its follow-on personal computer architecture its benefits remain largely esoteric while its costs are all too tangible. Unable as yet to demonstrate any compelling performance or functional improvement, IBM has had to combat the fact that the MCA obsoletes not only inventories of AT-compatible peripherals and memory cards, but a huge industrywide fund of AT-related engineering, support, and user skills.

Still, Big Blue's biggest MCA-related headache is that the market believes IBM is attempting to bulldoze the open AT-bus standard and construct in its place an edifice easy to enter but very difficult to leave.

Needing a 32-bit bus standard, yet wary of turning to IBM for the MCA, a slew of PC-compatible vendors led by Compaq last September introduced an alternative to MCA. The Extended

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Industry Standard Architecture, or EISA, is a "basically revised AT" (BRAT) architecture that purports to protect the open standard while making possible new and powerful functions that require the full 32-bit capability of Intel's 80386.

IBM's embattled position was made worse by an ill-timed introduction of a PS/2 with an AT bus. On the same day that the BRAT Pack was congregating in New York to openly defy IBM's efforts to redirect the PC industry, IBM was tacitly acknowledging its difficulties marketing MCA by introducing the PS/2 Model 30 286, its first 80286-based PS/2 without MCA.

How will the matter ultimately be resolved? By the market. EISA products, expected initially to be configured as workstations or servers, are expected to start rolling off heretofore-IBM-compatible vendors' production lines in the June time frame. If IBM's PC market share continues to slip in the face of BRAT Pack attacks, Big Blue has a big problem on its hands.

A Look Forward to 1989

What are likely to be the top stories upcoming? The *Gray Sheet's* survey of IDC analysts highlights three.

Standoff in the Unix World

While the marketplace waits for product to be delivered — promised by the end of 4Q89 are Unix System V.4 from AT&T, and OSF/1 and MOTIF from OSF — entertainment will be provided by the marketing and PR efforts of the two camps to discredit each other. This will serve to further heighten the industry's awareness of Unix, both its positive and negative aspects, but is not likely to result in anything even approximating a resolution.

The meaningful marketing work will take place behind closed doors in meetings with the "X factor" in the dispute: users. Getting product to market is the critical development goal of both organizations; getting powerful Unix users like the Federal government or GM to commit one way or the other is the marketing objective on both sides.

Will we see any such pronouncements of allegience in 1989? Probably. Users are becoming more outspoken in the industry, and, after all, they have as large a stake in who claims account control in the second generation of information systems as anyone. IT customers will begin throwing their weight around a little more forcibly in 1989.

No Shakeout Among RISC Alternatives, Yet

Not quite among the top stories of 1988, but close to them, was the entrance of reduced instruction set computing (RISC) into the computing mainstream. The positive features of RISC are many: better performance, lower silicon costs, and performance that scales across different classes of systems very well, to name a few.

RISC technologies are forcing the workstation and smaller-scale systems industries to accept new price/performance standards. Systems

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vendors are finding themselves in a position of having to rethink product strategies to accommodate the possibilities inherent in RISC.

To improve acceptance of their designs, many RISC chip architects have decided to openly license their RISC chip specifications to the industry. As a result, RISC has, along with Unix, become associated with open computing.

Not all RISC CPU designs, however, will be successfully commercialized. As software developers make development decisions in the coming year, certain chips will likely be ignored. By the end of the year, the winning RISC CPU designs will probably be obvious. The losing designs will be relegated to competing for embedded controller types of business. Nothing shabby about that, but nothing sexy about it either.

As of this juncture, the best positioned are the Sun SPARC, Motorola 88K, and MIPS RISC designs. The ***Gray Sheet*** expects that these three will gain momentum in 1989, while others start to fall away. Eventually, a shakeout is likely, but that is still a few years off.

A potential spoiler in the RISC race is Intel's anticipated "N10" chip. The ***Gray Sheet*** hears that Intel initially designed it to function as a controller, but customers have requested a CPU version.

One interesting sidepoint: What will happen to proprietary RISC designs, like HP's Spectrum and IBM's RT CPU? It's still too early to tell, although it is interesting that Digital decided to abandon its RISC development work in favor of the MIPS chip.

IBM Has a, well, Good 1989

It's been a long time since IBM's revenue growth has matched the rest of the industry's. In 1989, IBM may not only match industry growth, but perhaps even exceed it.

Two primary factors will fuel IBM's in 1989. The first is well-positioned products. Across the entire portfolio, IBM has solid product stories to pitch to users. Mainframe customers are looking at ESA for high-end performance needs. Small business and departmental users seem to be enamored of the hardware and software solutions of the AS/400. IBM should even, for the first time, be able to retain its share of the worldwide PC market, if only because it has lost so much in the past four years.

The two biggest areas of product weakness should be addressed during the coming year. IBM's supermini business will get a boost from a follow-on to the 4381. And a new RT system should help IBM's effort to crack the workstation market.

The second reason to expect good things from IBM is that it has far more trained feet on the street peddling IBM systems. IBM's drive of the past few years to redeploy employees away from staff positions and into revenue-generating slots should begin paying off this year. All those new sales and service people now have between one and two years of training and experience to go along with a stocked bag of products. Sales should be more brisk as a result.

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IF YOU CAN'T BUY 'EM, JOIN 'EM. Sequent and Unisys have announced a three-year agreement whereby Unisys will buy central Sequent systems and subsequently add peripherals and software. Assuming the deal goes well, two optional one-year extensions can be exercised by the two parties. Although Sequent expects the deal to contribute only $10M to the company's top line in the first year, it hopes that ultimately $250M in sales will be generated over the next five years.

ALL'S FAIR IN LOVE AND MINIS. A few years ago, when HP was struggling to deliver system software for its Spectrum family, Digital was kind enough to offer HP's customer base migration tools to the VAX. Well, DEC is not similarly struggling, but HP has decided to return the favor anyway. A program to help DEC VAX/VMS users move to HP's RISC/Unix HP 9000 platforms includes up to three months free use of a Series 800 HP-PA, training, a Fortran migration product, access to HP field-migration centers for aid in conversion analysis, and financing for any eventual lease, purchase, or rent of an HP-PA system.

ALPHA MICRO LEFT AT ALTER BY GA. Apparently it was too good to be true. Alpha Microsystems had hoped to absorb troubled General Automation, but learned through a press release that GA had instead signed a definitive agreement with Sanderson Electronics. Sanderson will provide GA with a convertible loan of $1.75M, and will receive the right to purchase up to 51% of GA at $.70 a share. The deal will bring to GA up to $4M in new equity.

CHANGES IN EXEC SUITES. After failing to land IBM's Ralph Martino for the job, AT&T has announced the appointment of another IBMer, Curtis Crawford, as vice president of national sales in Ma Bell's Data Systems Group. Interestingly enough, back at IBM Martino will take Crawford's old V. P. of marketing spot in Big Blue's National Distribution Division.

Also, MIPS Computer announced it had wooed former Apple and Data General executive Charles M. Boesenberg to be its vice president of marketing and run a yet-to-be-named new business unit.

LUCKY WE HAVE LAWYERS. What happens to ex-IBMers? A lot of them find their way into computer-industry-related jobs elsewhere. But not all. One old blue, John Ransom, started a winery and began marketing "user-friendly" vinos under the Big Blue label, including one called Interface. After a period of time, however, IBM took exception to Ransom's use of the company nickname and indicated that Ransom's Chateau Georges Winery could be infringing on IBM's legal domain. So naturally Ransom introduced his new wines under the Clone label. The moral of the story: You will sell no wine on IBM's time.

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EIS: The New Executive Tool, or Toy?

Thirty years ago, when computer futurists stared into their crystal balls, visions of two glamorous applications emerged from the fog of information technology possibilities. The first, artificial intelligence, remains at the periphery of feasibility. But the second, widespread use of executive information systems (EIS), may be evolving into reality.

Not surprisingly, the software industry is poised to take advantage of the trend to put senior executives online. Research on the EIS market prepared by IDC's Software Industry Research program points to the following:

- The U.S.-based EIS packaged software market will grow at a compound annual rate of nearly 40% annually, from $22 million in 1987 to $115 million in 1992.

- Total EIS software development expenditures should reach nearly $350 million by 1992. This figure includes not only purchases of basic software and custom consulting, but in-house software development costs as well.

- Currently, the host-based EIS market is comprised of two principal vendors, Comshare and Pilot Executive Software, with two others, Execucom and Thorn EMI Computer Software, set to leverage historical strength in the decision support software market to gain a stronger presence. But further push on the supply side is expected to come from heavyweights like Computer Associates and, of course, IBM.

- The PC-based LAN market appears not yet ripe. Countervailing forces to the lower hardware and software costs of PCs are executives' questions about data integrity and system reliability and availability in configurations of networked PCs. Should these concerns abate, Metapraxis, SEI CADET, and Corporate Class Software are in position to take advantage of any increase in demand.

- The market for packaged EIS substitutes, including financial modeling, spreadsheet, and specialized fourth generation languages, will reach nearly $335 million in 1992.

The popularity of EIS has been restricted by executives' reluctance to devote precious time to learning computer skills. But new technologies are shortening training times and lowering barriers to widespread use. Iconographic user-interfaces, touch-screens, mice, and other interactive computer tools are making information systems "idiot proof" by reducing the skill set required to operate them. (It's somewhat ironic that the most "intelligent" decision makers in American business are generally treated as though they are likely to be among the most stupid of computer users.)

Moreover, powerful application development tools, EIS "shell" programs, and relational database technology are making it easier for MIS to design systems in conjunction with their most demanding customers, and thereby to construct highly functional, yet flexible, information systems geared towards executive use.

The combination of simple and functional makes for EIS systems that are easier to build, maintain, learn, and use. Most of the tales being written today about EIS, in contrast to those of yesteryear, do not read like the latest Stephen King novel, but are instead stories of successful implementation and integration into the work systems found in executive suites.

What Is an EIS?

The premises of an EIS are simple: the corner office and its satellite staff need high-quality

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information (accurate, reliable, and timely) to effectively manage organizations, and computers can be effective means of delivering quality information to decision makers.

Executive involvement with computers to date, however, has been limited to glamorous activities such as check writing. The corner office has authorized huge data processing expenditures to automate business production systems. Computers have been used to lower the costs of back-office accounting systems, materials resource planning (MRP) systems, and other types of critical, labor-intensive clerical activities.

The fruits of these systems eventually find their way onto the executive's desk in the form of large summary reports written by support people. Although in this type of environment the senior decision maker is freed from the task of wading through reams of computer printout, the summaries they receive may be based on data so old as to be almost misinforming. Reports of this type may give the executive a view of the business as it was a week, month, or even a year ago.

In response, many executives have begun demanding access to the most recent data available pertaining to their business. MIS has for years been trying to respond by tailoring reliable online query and reporting systems to meet the executive's needs.

But whereas computers are perhaps the ultimate tools for supporting an organization's production systems, as a technology they have not so easily been transferred into the executive lifestyle.

Production systems are characterized by highly repetitive, regularly scheduled, grooved types of problems which can be solved algorithmically. Generally speaking, the information requirements of production systems can be rigidly defined in advance of the point of decision. Disciplines have arisen for unambiguously mapping these definitions into a computer topology. The process can be subjected to similar forms of cost/benefit analysis as with other types of investment decisions.

Executive decision-making systems, however, are of an entirely different type. Communicating and consensus building are two key activities. Neither are easily scheduled and usually require ad hoc adjustments as events warrant. Solutions to problems are reached not algorithmically, but (at best) heuristically — often the process appears to be totally irrational. The costs of developing computer topologies which reflect the patterns of activity in the executive suite are generally regarded as astronomical; the benefits are simply not measurable using normal practices.

So despite the simple premises of EIS, the true complexities of leadership engender obstructions that have been proven most difficult to overcome. The corner office has been loathe to invest its most precious resource — time — in an area that has historically not shown great returns.

Change is Favoring EIS

But EIS is becoming a better investment. The rewards of EIS are increasing while the risks are decreasing. A few of the new business imperatives and technologies supporting EIS:

- Improvements in computer technology. The technological foundation for EIS systems has improved significantly in the past few years: powerful workstations help improve response times; program-to-program communications widely expand a system's functional capabilities; and graphical end-user interfaces make the programs simpler to operate. The result is cheaper-to-learn, easier-to-use systems.

- Improvements in systems development technology. Newer application development tools facilitating communication between the development techies and the executive lower the risk of systems development. Using these tools, EISs can be piloted cheaply, iteratively

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determining an executive's informational needs and training thresholds, as well as the ultimate costs of the system.

• Recognition of the dangers of information capture. When one is making a decision, the recognized range of choices is largely a function of one's sources of information. Senior executives want to expand their sources of information rather than keep them narrow and focused.

• Bureaucracy busting. Many managers are striving to lower staff headcount. By putting concise information sources directly in the hands of executives, the resource dedicated to supporting whole bureaucratic layers can be redeployed.

• Keeping up with the competition. Stories of information being used for competitive advantage are the vogue in both the general and business press. Senior executives want to be certain their decision support systems are at least equal to their competitors'.

Perhaps the ultimate factor impelling the profusion of EIS into corporate America is experience gained from past efforts that failed. Many executives and MIS personnel have been involved with EIS disasters. Having learned what is required for successfully implementing these complex systems, and what aspects of an executive's job can be reasonably supported by computer technology, both groups are finding it easier to work together to design and implement quality systems and train prospective users.

Nothing Concluded Yet

Clearly, however, EIS is not a solution for all executives. Forcing the decision to install and use an EIS are a wide range of factors, not all of them founded on sound business judgment. Leading the list are issues pertaining to a business's competitive environment and the role of information as a resource. But also coming into play are characteristics such as age (younger execs are better disposed towards EIS than their older counterparts), politics (most successful EIS implementations are championed by executives, not MIS — the glass house still appears skittish about putting execs online), and the stance of favored suppliers towards EIS technology.

It is not yet clear that capturing prime EIS supplier status will engender rewards beyond the simple system sale. Executive end users are proving to be nitpickers for specification detail, but not for which piece of equipment to use. They show little inclination to dictate implementation, being more concerned with assuring that the system as a whole suffices.

Nevertheless, most system and many software vendors are beginning to take the view that EIS is too great a plum to pass up. As executives worldwide increasingly turn to computers to assist them in their work, their desks will be an important strategic battleground for vendors of computer technology.

3Q88 Money Matters

Except for a handful of PC suppliers, the third quarter meant financial trouble for most of the firms tracked by the ***Gray Sheet***. In each of the first two quarters of 1988, the combined revenues of predominantly multiuser systems vendors grew by around 11% over 1987. In the third quarter this year-to-year figure plummeted to just over 8%. Similar difficulties are being experienced among vendors that mostly supply non-PC customers in all segments.

But even the PC world is having its difficulties. IBM's decision to introduce the PS/2 with a 3.5" floppy and fixed-disk format against the 5.25" grain, has, after being initially discounted as something of a blunder, left many low-end disk-drive suppliers with excess production capacity and carrying tremendous inventories.

Two companies, Irwin Magnetic Systems and Xebec, had to be left off the ***Gray Sheet's*** list of financials because of difficulties procuring their reports. Gould did not report after being acquired by Nippon Mining last summer.

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Third Quarter 1988 Financials of Selected IT Vendors

(Source: company reports and International Data Corporation, 1988)

Category/Company	$Million 3Q88 Rev	$Million 3Q87 Rev	% Change	$Million 3Q88 Ear	$Million 3Q87 Ear	% Change
Computer Systems						
Alliant*	16.4	18.8	-13%	(1.1)	0.4	NA
Altos*	32.2	40.6	-21%	4.1	2.2	86%
Amdahl	464.7	362.7	28%	53.4	36.2	48%
Apollo	157.1	135.0	16%	(3.6)	(2.9)	NA
Apple	1,168.7	786.4	49%	107.9	71.7	51%
Britton Lee	6.6	7.7	-14%	(0.8)	(0.3)	NA
Commodore	200.2	173.9	15%	9.6	6.3	52%
Compaq	1,397.9	791.9	77%	163.3	87.3	87%
Computer Consoles	44.9	37.8	19%	3.4	0.6	451%
Concurrent*	59.0	66.9	-12%	(23.6)	(17.6)	NA
Control Data*	841.4	831.3	1%	(7.2)	6.7	NA
Convergent*	119.1	104.1	14%	6.4	2.0	212%
Convex*	27.5	18.4	50%	1.6	2.2	-26%
Cray	145.2	184.6	-21%	22.6	36.1	-37%
Data General*	341.5	332.3	3%	(49.8)	(24.6)	NA
Digital	2,941.8	2,529.8	16%	223.4	269.9	-17%
Harris*	486.5	506.6	-4%	20.6	53.8	-62%
Hewlett-Packard	2,709.0	2,279.0	19%	243.0	218.0	11%
IBM	13,396.0	12,727.0	5%	1,247.0	1,208.0	3%
Kaypro	13.3	20.5	-35%	(7.1)	(10.9)	NA
MAI Basic Four*	117.9	91.9	28%	5.8	7.0	-17%
MASSCOMP*	18.7	20.3	-8%	(0.4)	1.4	NA
NBI*	29.2	37.6	-22%	(7.7)	(3.3)	NA
NCR	1,407.4	1,339.5	5%	103.1	97.8	5%
Prime*	391.4	236.2	66%	11.7	15.9	-26%
Pyramid	23.2	15.8	47%	2.6	1.0	151%
Sequent	20.6	9.8	111%	1.7	0.8	113%
Silicon Graphics	44.3	28.9	53%	1.0	3.0	-67%
Stratus	68.9	48.8	41%	7.6	5.3	43%
Sun Microsystems	388.5	191.7	103%	20.6	12.9	59%
Tandem*	384.0	293.8	31%	30.2	29.8	1%
Tandon*	57.6	76.4	-25%	(12.0)	1.0	NA
Tandy	937.0	838.2	12%	64.9	64.3	1%
Teradata*	25.5	15.0	70%	1.9	1.7	15%
Unisys	2,267.7	2,223.2	2%	151.0	129.7	16%
Wang	723.1	693.0	4%	13.1	22.5	-42%
Subtotal	31,473.8	28,115.4	12%	2,408.2	2,335.9	3%

**Alliant 3Q1988 income includes $1.9M in loss carryforwards. Altos 3Q1988 income included $5.7M from sale of Communications Solutions. Concurrent and MASSCOMP merged under the name Concurrent September 27, 1988; MASSCOMP 3Q financials were released as Concurrent results for the quarter, but are stated here as MASSCOMP; "Concurrent" figures are derived by subtracting "MASSCOMP" figures from pro forma results; income for the latter includes allocation of liabilities, etc. CDC income includes gains of $4M (1988) and $1M (1987) from sale of stock holdings, and $4.8M (1988) and $100K (1987) from carryforwards. Convergent 3Q1988 income includes $1.9M loss carryforward. Convex 3Q1987 income included $840K in loss carryforwards. Data General 3Q1988 loss includes $48.7M restructuring charge; 3Q1987 loss included $26M in extraordinary losses. Harris 3Q1987 income included $35.1M from accounting change. MAI Basic Four 3Q88 revenue includes sales of various software and services companies acquired during quarter. NBI 3Q1987 loss included $1.8M from discontinued operations. Prime 1987 figures do not include Computervision, which reported $132M in revenue for 3Q1987; if this were added in, Prime revenue grew 6% for the quarter. Tandem 3Q1987 figures restated to include Atalla merger but do not include Ungermann-Bass, which reported $38.2M in revenue in 3Q1987. If UB sales were added in, Tandem's 3Q1988 revenue grew 21%. Tandon 1987 revenue restated to eliminate discontinued operations; 3Q1987 income includes $366K loss from discontinued operations. Teradata 3Q income includes tax benefits of $661K (1988), $607K (1987).*

Peripherals and Communications						
Alloy	9.7	11.0	-12%	0.5	0.5	-7%
AST Research	108.4	78.6	38%	0.3	0.1	325%
Cipher Data	52.0	39.3	32%	3.8	0.7	460%
Dataproducts	88.2	80.6	9%	1.1	(6.3)	NA

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THIRD QUARTER Category/Company	$Million 3Q88 Rev	$Million 3Q87 Rev	% Change	$Million 3Q88 Ear	$Million 3Q87 Ear	% Change
Emulex	36.2	28.8	26%	1.6	0.8	116%
Key Tronic	30.8	18.9	20%	(0.2)	0.7	NA
Maxtor	81.5	60.4	35%	1.1	1.2	-12%
Micropolis	95.0	75.2	26%	(12.6)	8.9	NA
Miniscribe	177.6	103.8	71%	15.0	8.4	78%
Network Systems	34.1	33.8	1%	4.1	5.8	-29%
Paradyne*	56.8	58.2	-2%	(37.4)	0.3	NA
Priam	34.0	31.1	9%	0.2	(2.5)	NA
Quantum	39.8	49.5	-20%	8.6	4.4	98%
Rexon*	49.4	27.7	78%	5.3	2.8	88%
Seagate	303.2	226.1	34%	(52.8)	16.5	NA
StorageTek	199.2	185.9	7%	0.8	3.2	-76%
Western Digital	247.0	140.1	76%	12.9	12.2	6%
Wyse	129.4	102.6	26%	3.3	7.1	-54%
Subtotal	1,772.1	1,358.5	30%	(44.5)	62.8	NA

**Paradyne 3Q1988 loss includes $32M unusual charges. Rexon 3Q income includes special credits of $1.5M (1988), $0.9M (1987).*

Software/Services/VARs						
Ask Computer	39.3	26.6	48%	2.4	1.9	26%
Ashton-Tate*	75.7	68.0	11%	11.7	11.1	6%
ADP	396.1	361.3	10%	34.4	30.4	13%
Boole & Babbage	16.4	12.1	35%	1.0	0.7	45%
Comdisco	350.9	327.3	7%	26.6	31.9	-17%
Computer Associates	223.7	168.3	33%	28.9	16.0	81%
Computer Sciences	299.5	281.3	6%	12.0	9.9	21%
Cullinet*	52.5	49.1	7%	(0.4)	(5.8)	NA
Cybertek	5.1	5.9	-13%	0.1	0.2	-21%
Daisy Systems	30.9	27.6	12%	2.8	0.5	522%
Data I/O*	16.1	15.8	2%	1.5	(0.2)	NA
EDS	1,224.7	1,126.0	9%	95.9	82.3	17%
Informix*	23.7	17.7	34%	0.1	2.7	-96%
Intellicorp*	5.4	5.1	6%	0.4	(0.6)	NA
Intergraph	207.2	157.1	32%	22.5	18.4	22%
Interleaf*	18.4	12.7	44%	0.1	1.3	-91%
Lotus	116.8	101.2	15%	14.3	19.1	-25%
Mentor Graphics	77.6	56.0	39%	8.8	5.3	66%
MSA*	22.4	23.3	-4%	(28.3)	(8.4)	NA
Microsoft	176.4	102.6	72%	36.6	21.3	72%
Software Pub.	23.9	10.7	123%	4.3	1.5	189%
Symbolics*	16.3	24.0	-32%	0.4	(4.5)	NA
VM Software	9.7	6.0	61%	0.9	0.2	422%
Subtotal	3,465.0	3019.1	15%	277.2	234.6	18%

**Ashton-Tate results for quarter ending October 31. Cullinet for quarter ending October 31. Data I/O 3Q1987 loss included $350K write-off. Informix 3Q1988 income includes $615K gain from loss carryforward. Intellicorp 3Q1988 income includes $148K in loss carryforwards. Interleaf 3Q1987 income included $341K extraordinary credit. MSA loss includes a $27.9M one-time charge related to consolidation of operations and adjustments to capitalized software. Symbolics 3Q1987 loss included $2.3M in unusual charges..*

Semiconductors/Components						
AMD*	285.5	260.9	9%	4.6	(72.3)	NA
Chips & Techs.	44.0	29.6	49%	5.7	4.7	22%
Intel	784.9	501.1	57%	142.7	80.5	77%
LSI Logic	94.0	68.9	36%	7.5	3.2	134%
Texas Instruments	1,577.4	1,416.3	11%	93.7	74.1	26%
VLSI Tech	58.8	44.8	31%	2.3	2.1	11%
Subtotal	2,844.7	2,321.6	23%	256.5	92.3	178%

**AMD 3Q1987 net included $41M in merger-related costs.*

TOTAL	39,555.5	34,814.6	14%	2,897.4	2,725.5	6%

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Selected Financials First Three Quarters 1988

(Source: company reports and International Data Corporation, 1988)

Category/Company	$Million 1-3Q88Rev	$Million 1-3Q87Rev	% Change	$Million 1-3Q88Ear	$Million 1-3Q87Ear	% Change
Computer Systems						
Alliant	44.2	49.4	-11%	(8.8)	4.9	NA
Altos	120.7	121.5	-1%	17.8	8.1	120%
Amdahl	1,256.1	1,022.2	23%	150.4	92.4	63%
Apollo	464.5	390.7	19%	(1.1)	11.2	NA
Apple	3,028.9	1,998.8	52%	246.0	153.0	61%
Britton Lee	21.5	18.7	15%	(0.9)	(6.5)	NA
Commodore	615.7	533.8	15%	31.4	9.4	234%
Compaq	2,294.2	1,270.4	81%	268.8	138.1	95%
Computer Consoles	126.8	109.2	16%	9.7	2.3	316%
Concurrent*	189.5	199.7	-5%	(16.5)	(12.0)	NA
Control Data*	2,695.3	2,439.0	11%	14.5	8.5	71%
Convergent	318.4	284.4	12%	4.3	(8.7)	NA
Convex	74.8	49.5	51%	3.9	7.0	-45%
Cray	425.4	523.7	-19%	68.1	113.0	-40%
Data General	1,021.9	961.1	6%	(27.8)	(98.7)	NA
Digital	9,105.2	7,608.9	20%	929.5	954.8	-3%
Harris	1,549.6	1,591.0	-3%	47.1	102.0	-54%
Hewlett-Packard	7,639.0	6,350.0	20%	637.0	528.0	21%
IBM	38,744.0	36,206.0	7%	3,459.0	3,171.0	9%
Kaypro	49.7	75.6	-34%	(10.9)	(10.9)	NA
MAI Basic Four	335.6	249.0	35%	18.8	19.2	-2%
MASSCOMP	55.9	61.8	-10%	(10.3)	5.7	NA
NBI	93.9	120.9	-22%	(40.9)	(4.6)	NA
NCR	4,185.7	3,820.6	10%	289.7	257.9	12%
Prime	1,163.5	693.9	68%	47.9	55.4	-13%
Pyramid	62.3	42.1	48%	6.9	2.3	NA
Sequent	51.9	26.4	97%	4.3	2.9	49%
Silicon Graphics	132.5	80.5	65%	7.8	6.4	22%
Stratus	185.9	129.0	44%	20.1	12.9	57%
Sun Microsystems	1,013.3	520.8	95%	60.1	34.0	77%
Tandem	1,032.4	807.3	28%	70.8	78.2	-9%
Tandon*	219.0	194.0	13%	1.2	11.7	-90%
Tandy	2,589.6	2,351.8	10%	186.2	159.0	17%
Teradata	80.6	42.2	91%	10.8	3.9	174%
Unisys	7,028.1	6,914.0	1%	462.6	361.1	28%
Wang	2,313.8	2,262.9	2.2%	49.2	60.4	-18.5%
Subtotal	90,329.4	80,120.8	13%	7,006.8	6,233.1	12%
Peripherals and Communications						
Alloy	30.2	33.9	-11%	(2.5)	2.1	NA
AST Research	349.9	197.2	77%	13.3	6.3	112%
Cipher Data	152.6	127.5	20%	11.4	3.0	276%
Dataproducts	269.6	243.0	11%	(13.0)	(4.3)	NA
Emulex	102.1	81.9	25%	5.3	3.1	70%
Key Tronic	78.0	62.8	24%	(12.4)	2.5	NA
Maxtor	247.5	166.8	48%	9.1	7.4	24%

**Concurrent and MASSCOMP merged under the name Concurrent September 27, 1988; MASSCOMP 3Q financials were released as Concurrent results for the quarter, bet are stated here as MASSCOMP. "Concurrent" figures are derived by subtracting "MASSCOMP" figures from pro forma results; income for the latter includes allocation of liabilities, etc.; also, the financial cycle follwed by "Concurrent" has lagged MASSCOMP's reporting schedule by one month; hence July is counted twice but January not at all. CDC income includes $4M (1988) and $45.4M (1987) from sale of holdings, and $7.2M (1988) and $1M (1987) from tax loss carryforwards. Tandon 1987 revenue restated to eliminate discontinued operations.*

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Category/Company	$Million 1-3Q88Rev	$Million 1-3Q87Rev	% Change	$Million 1-3Q88Ear	$Million 1-3Q87Ear	% Change
Micropolis	273.0	207.9	31%	(4.2)	20.0	NA
Miniscribe	486.6	246.3	98%	40.5	22.1	83%
Network Systems	95.2	84.6	13%	9.9	11.9	-17%
Paradyne	172.8	172.1	0%	(40.2)	(3.2)	NA
Priam	110.2	102.4	7.6%	2.7	(5.2)	NA
Quantum	120.9	121.6	-1%	0.8	3.8	-79%
Rexon	126.7	79.2	60%	9.9	7.6	31%
Seagate	1,010.6	743.2	36.0%	(13.1)	94.1	NA
StorageTek*	594.8	541.8	10%	15.7	20.4	-23%
Western Digital	714.5	412.4	73%	35.8	39.3	-9%
Wyse	423.2	268.0	58%	19.5	18.0	8%
Subtotal	5,389.3	3,918.3	38%	88.3	249.7	-65%
**StorageTek 2Q1988 restated due to erroneous reporting of sales; 1987 income includes $4.2M from income tax accounting change.*						
Software/Services/VARs						
Ask Computer	122.8	83.4	47%	9.0	6.1	48%
Ashton-Tate*	220.0	191.8	15%	34.3	30.3	1%
ADP	1,207.3	1,090.3	11%	134.3	109.7	22%
Boole & Babbage	44.4	32.4	37%	2.7	1.7	60%
Comdisco	981.9	907.3	8%	72.6	85.9	-16%
Computer Associates	615.9	453.7	36%	79.7	42.6	87%
Computer Sciences	907.9	846.4	7%	37.5	30.2	24%
Cullinet*	160.7	159.2	1%	(26.2)	(17.9)	NA
Cybertek	16.0	17.4	-8%	0.0	0.2	-82%
Daisy Systems	89.4	75.5	18%	5.9	(15.0)	NA
Data I/O	49.0	49.3	-1%	2.9	1.4	116%
EDS	3,543.1	3,240.0	9%	280.7	218.9	28%
Informix	75.6	45.8	65%	4.1	6.3	-36%
Intellicorp	15.8	16.4	-4%	0.6	(3.3)	NA
Intergraph	585.3	445.8	31%	63.0	45.1	40%
Interleaf	53.6	35.1	53%	2.7	2.7	1%
Lotus	356.2	280.0	27%	49.9	49.1	2%
Mentor Graphics	217.2	160.4	35%	23.8	14.2	68%
MSA	190.7	192.4	-1%	(19.6)	5.5	NA
Microsoft	508.7	300.8	69%	103.9	57.6	80%
Software Pub.	59.2	29.9	98%	11.0	4.0	178%
Symbolics	49.9	77.8	-35.9%	(25.7)	(7.9)	NA
VM Software	28.3	19.1	48%	2.9	1.1	165%
Subtotal	10,098.7	8,750.1	15%	850.0	668.6	27%
**Ashton-Tate for quarters ending April 30, July 31, and October 31. Cullinet for quarters ending April 30, July 31, and October 31.*						
Semiconductors/Components						
AMD	877.8	734.5	20%	50.8	(63.9)	NA
Chips & Techs.	123.5	79.9	55%	17.5	12.3	43%
Intel	2,147.4	1,334.6	61%	367.1	152.5	141%
LSI Logic	259.5	183.9	41%	19.4	5.6	249%
Texas Instruments	4,602.7	4,059.8	13%	271.0	230.4	18%
VLSI Tech	156.3	125.0	25%	3.8	5.2	-28%
Subtotal	8,167.2	6,517.7	25%	729.7	342.0	113%
TOTAL	113,984.7	99,307.0	15%	8,674.7	7,493.3	16%

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SOVIETS TO CRAFT CLONE PCs. In the March time frame, Swedish PC users will be introduced to a new brand of XT and AT clones. These won't be assembled in Korea, Taiwan, or Texas, but in the Baltic provinces of the USSR. A short supply of Western currency and cheap labor — and recent relaxations in U.S. export controls (see the *Gray Sheet*, 24:5, August 27, 1988) — will together allow the Soviets to sell an XT clone for under $700 and an AT clone for about $1,250. The bears are bullish on their prospects, although they plan a conservative ramp: 10,000 units should be produced next year, about half destined for export.

TI FEEDS THE MOUTH THAT BITES IT. As the Semiconductor Industry Association wails about the vicious competitive practices of the Japanese, Texas Instruments has decided to enter into an agreement with Hitachi to jointly develop 16-megabit DRAM technology. Each company has agreed to share DRAM technologies associated with 16-bit development. According to TI, the agreement could be used as a framework for future cooperative DRAM development ventures.

DEC WRAPS ITSELF IN IBM TAPE. Emphasizing the company's commitment to important industry standards, Digital announced it will OEM IBM 3480 Magnetic Tape Subsystem technology for use in future high-performance tape drives. The products, when delivered, will provide Digital's customers with data interchange capability between DEC and IBM systems. That's nice, but they will also give IBM an even bigger club with which it can pound Digital's already badly bruised high-end I/O marketing message.

SUN STOCK FISSION. Being a darling on Wall Street has its disadvantages as well as its positive aspects — especially in these turbulent times. Sun, a favorite of the institutional investor set, has seen its stock bounce about like the control path of an application written by a lousy programmer. Eager to avoid another slam resulting from Digital's workstation announcement, Sun has effected a two-for-one stock split to increase its common and common-equivalent float to about 83 million shares outstanding and halve the price of its stock. In doing so, Sun hopes to attract a more stable base of smaller investors.

NEW FACES NEAR THE TOP. Control Data Corporation and Conner Peripherals have each announced changes in its upper management ranks. CDC named Lawrence Perlman president and chief operating officer. Mr. Perlman had been running CDC's peripherals business, the ailing systems vendor's most successful segment.

Conner has appointed William J. Almon, until now IBM vice president of low-end storage products, as president and chief operating officer. William J. Schroeder, who had held Almon's position, will assume new duties as president of Conner's New Products Group. The moves are meant to insure Conner's position as an innovative disk-drive vendor while at the same time enhance the company's day-to-day operations.

WHOOPS! Due to the vicissitudes of desktop publishing, the final concluding sentence of the December 16, 1988, issue was printed unfinished. It should have read: "As both hardware and software become more standardized, competitiveness at the building block level will remain a key to long-term success." We are sorry for any inconvenience this glitch may have caused.

WE MOURN. No thief is so cruel as "the grim ferryman." After nineteen years of dedicated service to the *Gray Sheet* and to IDC, death has stolen our friend Mary Trayte from us. Longtime readers will remember her as the wonderful English personality that graciously and expeditiously attended to their circulation questions. She was an extraordinary woman, someone who lived with optimism, courage, dignity, and joy. We will remember her with affection, and miss her enormously.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR DECEMBER 16, 1988 • VOL. 24, NO. 13 PATRICK J. MCGOVERN, PUBLISHER

IBM/Fujitsu "Settlement" Highlights Challenges of Competing In and With Japan

Although the *Gray Sheet* believes that the last word on the software dispute between IBM, Fujitsu, and (lest we forget) Hitachi, has not been written, the recent American Arbitration Association decision typifies the high stakes interplay of competition, cooperation, and dependence that defines the overall U.S./Japanese technology relationship.

On the one hand, the major Japanese vendors have proven themselves capable of mastering most of the hardware technologies that matter. Be it semiconductors, peripherals, laptops, supercomputers, magnetics, optics, or cryogenics, the Japanese have earned a position of approximate hardware parity.

On the other hand, U.S. companies continue to dominate the worldwide computer business. Except through OEM arrangements, Japanese companies have found it difficult to exploit CPU markets outside of Japan. Even though the Japanese domestic market is the world's second largest, export success remains the key to assuring the necessary market influence and economies of scale.

Recently, the *Gray Sheet's* sister publication, ***EDP/Japan Report***, has completed its annual Japanese Computer Industry Review and Forecast. This issue summarizes the report's findings on today's U.S./Japanese processor competition. Among the key themes:

- Regionalism. Although the computer industry is often referred to as a global market, the essential dynamics of competition in the Japanese PC, midrange, and large systems areas are quite different from those in the U.S. or Europe.
- Standards. Much to the Japanese disadvantage, most of the key and emerging hardware and software standards — MVS/ESA, Unix, OS/2, Microchannel, EISA, SNA (but not OSI), microprocessors, and DBMSs — are being set in the U.S.
- Technology change. The ongoing shift from timeshared host designs toward workstation-centered topologies has created so much market turbulence that Japanese vendors have found it nearly impossible to develop long-term product strategies.

Worldwide Multiuser Systems Leaders, 1987 Value of Shipments

(Source: International Data Corporation, 1988)

1. IBM	5. Hitachi	9. HP
2. DEC	6. NEC	10. NCR
3. Unisys	7. Bull*	11. Amdahl
4. Fujitsu	8. Siemens	12. Wang

*Includes Honeywell Bull

The above is a ranked list of the worldwide leaders of non-PC computer systems, determined by who sold the products rather than who made them. Thus, in this view, Bull shipments of NEC mainframes are counted as Bull sales, not as an NEC export.

When counted this way, U.S. vendors control 72% of the worldwide processor market, even though Japanese and European companies actually account for five of the top ten worldwide suppliers. This seeming anomaly stems from the fact that largely due to a lack of start-up activity over the years, the European and Japanese

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computer industries are much more concentrated than in the U.S. Once one gets beyond the top ten, U.S. firms dominate.

This difference in underlying structure has many implications for future industry developments. If size alone is perceived as a compelling advantage, one might expect the non-U.S. suppliers, particularly the Japanese, to gain share. However, the history of the computer industry has been one of continual redistribution of wealth with the major firms slowly losing share. Since the rate of innovation in the processor business is currently at a very high level, we think it unlikely that the established players will be able to hold their position over the next few years. This bodes well for U.S. suppliers.

A second major structural difference is seen in the size class composition of the major regional markets. Whereas the structures of the U.S. and European multiuser markets are fairly similar, the Japanese market is highly skewed to mainframe systems. There are two main reasons for this:

- The Japanese economy is characterized by very large, vertically integrated and diversified corporations that tend towards highly centralized data processing environments.

- The major Japanese hardware suppliers have put much more effort into designing mainframe systems than traditional supermini designs.

These two factors, along with advanced components, go a long way to explain why the Japanese vendors remain so committed to the mainframe business even in these times of slow growth.

Mainframe positioning

Contrary to popular wisdom, IBM does not control 70% of the worldwide mainframe market. It has 70% of the U.S. market, and over 70% of U.S. companies' worldwide sales, but when the Japanese and European firms such as Fujitsu, Hitachi, NEC, Siemens and Comparex are included, IBM's portion drops to 51%. Impressive as this figure may be, the $27 billion worldwide large-scale hardware market is still big enough to support several other significant players.

Over time, however, the number of these players is shrinking, especially behind the scenes. During the 1980s, vendors such as ICL, Honeywell, Bull, and Comparex (previously the IBM-compatible portion of Siemens and BASF's computer business) have all turned toward Japan for mainframe CPU technology.

Coupled with the merger of Unisys, the list of large-scale CPU manufacturers has shrunk from 16 in the late 1970s down to eight: IBM, Unisys (with some help from Hitachi), Amdahl (with lots of help from Fujitsu), Cray, CDC, Fujitsu, Hitachi, and NEC.

Given the specialized nature of the Cray and CDC machines, and the strong product and financial ties between Fujitsu and Amdahl, one can fairly say that there are really only five independent large-scale general-purpose manufacturers — IBM, Unisys, Fujitsu, Hitachi, and NEC. Of these only IBM is largely in control of its own fate.

Both Fujitsu and Hitachi have to deal within an environment of severe software constraints. Although the operating systems they sell in Japan are similar to IBM's MVS, they are not compatible. As the two companies look to sell their CPUs overseas, they have to take a hardware-only approach since their customers buy nearly all of their system software from IBM. This, of course, gives IBM tremendous flexibility in its software and hardware pricing, while putting the PCMs in a perpetual catch-up mode. Nothing in the recent AAA settlement is likely to reverse this disadvantage.

Fujitsu is clearly IBM's chief mainframe worry. It has arguably the best large-system

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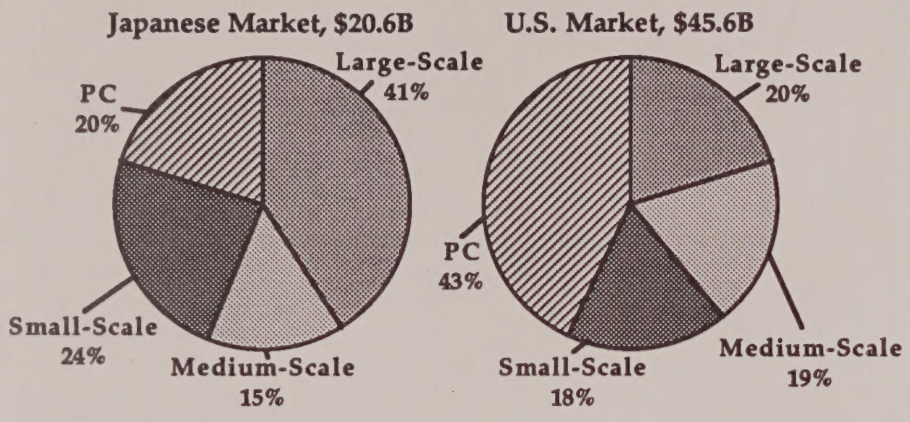
The Japan and U.S. Markets by Value of Segment, 1987

(Source: International Data Corporation, 1988)



technology in Japan; it is the leading Japanese high-end supplier; and the substantial resources of Amdahl are of great help on the compatibility front. Perhaps the most positive result of the announced settlement is that it may help Fujitsu regain a chunk of the European market, as the spectre of possible legal entanglements with IBM diminishes.

For its part, Hitachi has never had the mainframe market share it would like, and its commitment to the IBM-compatible market has often been questioned, particularly recently as it has been slow to keep up with the latest IBM mainframe innovations such as MVS/ESA, PR/SM, and Expanded Storage.

This lack of responsiveness is causing major problems for its key OEM customers such as National Advanced Systems in the U.S. and Comparex in Europe. Rumors of impending changes in the current arrangements are likely to prove well founded.

Of the three Japanese players, Hitachi is the one least dependent on mainframes (and for that matter computers in general). Unlike Fujitsu and NEC, Hitachi is a highly diversified company, making everything from power tools to elevators. Although no such plans are known or implied, it clearly could exit the mainframe business without disastrous corporate impact.

Over the last few years, both Honeywell Bull and Bull of France have come to rely on NEC for their high-end needs. The NEC hardware is considered excellent, but, unfortunately, the GCOS/ACOS environments are not advancing quickly enough to remain competitive, and the overall Honeywell/Bull/NEC share of the mainframe business is slowly but steadily falling.

Although the worldwide base of Honeywell/Bull/NEC large-scale machines is substantial, annual shipments are comparatively small, making it difficult to achieve the required economies of scale. Given the steady worldwide user tilt toward S/370-based mainframe computing, there does not seem to be all that much NEC or anyone else can do about this trend.

Supercomputer squabbles

Because of their links to national security, and because they are seen as a measure of our technological health, supercomputers get much more publicity than their market size alone will ever warrant. And although from a U.S. perspective the general tone seems to be one of fear and trade policy accusations, from the Japanese point of view competing in the worldwide supercomputer business has been an extremely frustrating experience.

Annual unit sales of Japanese supercomputers outside of Japan can be counted on one's fingers, and although the domestic market is substantial, it is not big enough to support six players — Cray, CDC/ETA, Hitachi, Fujitsu, NEC, and IBM 3090VF. It is also fiercely price competitive. Indeed, Japanese supplier motivation often seems as much one of pride as of profits.

From a product perspective, although the Japanese machines are considered quite fast, machines such as NEC's have had little to no application software, and the IBM-compatible

(continued on p.6)

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The IBM/Fujitsu Agreement

A nonlegal reading of the arbitrated agreement between IBM and Fujitsu leads the *Gray Sheet* to believe that arbitrators Mnookin and Jones have been successful in their endeavor to settle the dispute fairly. Neither side appears grossly advantaged or disadvantaged by the finding, and there appears to be a workable system in place for quickly resolving further areas of contention.

Fujitsu gains (so long as the Japanese vendor adheres to strict instructions laid out by the arbitrating board) certainty that into the middle of the next decade its S/370-compatible operating environment development work can proceed immune from IBM attacks. In critical areas such as networking, DASD sharing, and application portability are concerned, Fujitsu is now in a position to reassure customers and partners concerned with the future of its systems software.

However, the instructions require IBM to detail only what interfaces do, not how they do it. Big Blue can rest knowing it's not completely underwriting a competitor's development efforts.

Strict limitations have been imposed on Fujitsu's use of the information it collects under the agreement. It can make available, but not sell, interface specifications to partners, such as independent software developers. Fujitsu's partners, in turn, are protected from IBM reprisal so long as they make use of Fujitsu's findings only in programs for Fujitsu's operating environments. Efforts by or targeted to Amdahl machines are not similarly protected. Unless Fujitsu moves to purchase a majority interest in the U.S. plug-compatible mainframer, Amdahl should receive no dispensation as it labors to stay technologically abreast of Armonk.

Moreover, Fujitsu is required to license IBM system software to its customers wishing to install the real thing. IBM's chief Japanese mainframe rival has always refused any of its customers' requests to install IBM system software. In a hotly competitive, and still very lucrative, Japanese mainframe market, this may provide IBM with opportunities to attack Fujitsu's installed base — especially now that the depressed dollar makes IBM hardware relatively cheap by comparison.

Does this make it easier for Fujitsu to enter the "plug-compatible operating system" business, thereby undermining IBM's control of its mainframe installed base? No. The issue of whether or not a viable market for such programs exists aside (and the *Gray Sheet* believes there is none), immunity flows to Fujitsu so long as the company is using IBM interface information to develop compatible software for Fujitsu machines. There is no apparent reason to believe that Fujitsu will receive the same protection for software developed for non-Fujitsu machines, including IBM.

Are IBM and Fujitsu's disputes completely settled? Also no. IBM's future operating system directions are difficult to gauge, but one subsystem certain to gain importance over time is notably absent from the list of subject software: Database 2 (DB2). To increase performance, IBM may incorporate significant database services into future base versions of its S/370 operating systems. If this is true, Fujitsu will most certainly demand access to relational interfaces below the common programming interface of SAA.

Was IBM victimized by overzealous arbitrators, forced (in return for a measely $833 million) to relinquish the "crown jewels" to a usurper who doesn't fight fairly? A final no. In the *Gray Sheet's* opinion, industry and press reaction has been a bit extreme.

The search for a solution began at the point of a flawed 1983 agreement in which IBM agreed to sell Fujitsu interface information. The panel thus used precedent established by IBM. Moreover, the search was conducted using only those powers granted by the disputants. It's time to stop charging at the windmills of "Japan Inc." There's plenty of real competition around, both here and from abroad.

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The Japanese Perspective of the IBM/Fujitsu Agreement

with Yugi Ogino, Editor EDP/Japan Report

Many Japanese computer vendors view the IBM/Fujitsu operating system software dispute as another manifestation of the trade tension that has come to dominate relations between the two countries. IBM in particular, some would note, has throughout this decade displayed an alarmist attitude concerning the real or imagined implications of competing against the Japanese.

Japanese computer suppliers are concerned that new trade legislation reflecting this increasingly rancorous environment may generate more lawsuits against Japanese companies. In the mainframe domain, the interests of both users and vendors in Japan have centered on three issues: (1) to what extent advanced software interface information, especially that relating to SNA and MVS/ESA, will become available; (2) by what means it will become available; and (3) what conditions will be imposed on the use of such information by Fujitsu.

On all three counts, the Japanese seem generally pleased with the results of the American Arbitration Association's work. "The AAA ruling is reasonable and will contribute to the establishment of efficient procedures for the solution of issues related to intellectual property. The amount of license fees Fujitsu has been ordered to [pay] IBM are the result of rational investigation and [are] thus fair compensation," a MITI official commented.

As an arbitrated agreement, the AAA's finding has limited application as a precedent in resolving other disputes. Still, the Japanese hope that the instructions delivered to Fujitsu and IBM might serve as general guidelines for assessing appropriate competitive behavior. Of particular interest, the AAA smiled upon Fujitsu's use of well-documented reverse engineering of interfaces, whereby the results of runtime tests are studied to reconstruct significant program components.

Effects on Hitachi-IBM Relationships

AAA arbitrator John L. Jones stated that the arbitrators' order on the Fujitsu-IBM issue has no material effect on the Hitachi-IBM agreement reached in October of 1986. That agreement empowers Hitachi, for certain fees paid to IBM, to develop compatible software using certain intellectual properties of IBM (known as "external information"). Details of the agreement haven't been cleared for release yet. However, the Japanese believe that, in view of the current friendly relationship between Hitachi and IBM, Big Blue will move to grant Hitachi access at least equal to that won by Fujitsu.

Thus, if Hitachi's restrictions are harsher than those awarded to Fujitsu, IBM will ease them to a similar point. If the case is the other way around, however, IBM is not expected to impose additional constraints on Hitachi.

Effects on NEC's Computer Business

NEC has been maintaining its position as a non-IBM compatible vendor. This policy has worked adversely for NEC in the large-scale mainframe market in which NEC's share is far below that of IBM, Fujitsu, and Hitachi.

However, NEC has continued to hold an overwhelming share of the nation's PC market. And as PCs are increasingly replacing terminals, the AAA ruling may have immediate effect on NEC's possible copyright confrontation with IBM in the sale of 3270-compatible devices. Both NEC and Fujitsu have been successfully selling 3270-compatible terminals in the Japanese market. In order to keep these Japanese vendors from its customer base, IBM has enhanced its terminals by including LU 6.2 functions. But now NEC may be in position to demand, for a fee, the same access to SNA protocols as that held by Hitachi and Fujitsu.

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approach of Fujitsu and Hitachi has proven largely off the mark. Thus, all three suppliers are now looking to Unix to broaden their appeal.

Since many observers believe that the next generation of Japanese supercomputers (Fujitsu has just delivered the first of many expected to be announced in the coming year) will be the world's fastest, the growing acceptance of Unix could create Japan's first real worldwide supercomputing opportunity.

However, from a market vantage, the reality of the situation is that both the U.S. and Japanese domestic supercomputer markets are understandably extremely nationalistic. And despite all the U.S. protestations on the subject, the fact remains that there are a lot more U.S. supercomputers in Japan than vice versa. When M.I.T. came close to buying an NEC machine, the political pressure quickly became unbearable. Ultimately, Europe may emerge as the only truly open major supercomputer market.

New Large-Scale Approaches

The *Gray Sheet* believes that the Japanese may well eventually take a slight lead in traditional supercomputing — at about the same time that this approach to high performance computing is just beginning to recede in importance. In the 1990s, the scientific community will be increasingly focused on parallelism to achieve the desired orders of magnitude performance increases.

Vendors such as Teradata, Thinking Machines and others may still be small, but they represent the first radically different large-scale systems development activity in this decade. Whether these particular companies succeed or not, IDC believes that highly parallel systems will eventually create some significant new large-scale market entrants in both technical and commercial environments. Nearly all of this work is centered in the U.S.

Large-Scale Wrap-Up

All told, Japanese mainframe manufacturers account for about 30% of all large-scale systems built worldwide. But since about one-third of these machines go through OEM customers, Japanese control of mainframe users is much less, only about 20%. Although the Japanese suppliers have been steadily gaining shares in recent years, most of the gain has been on the OEM side. As long as Unisys can remain a competitive high-end supplier, major new OEM deals are unlikely, and thus the U.S. should be able to hold most of its current share for at least the next three years.

Medium-Scale Doldrums

Compared to large-scale systems where the situation is generally defined by the competition and interrelationships between a handful of multibillion dollar corporations, the medium-scale systems business is less prestigious, but more competitive and much more U.S. dominated. It is also under a lot more pressure from increasingly powerful microprocessor-based systems.

Of the three multiuser-size classes, medium-scale systems have been the least important for Japanese suppliers who never really developed the sort of 32-bit superminis that DEC, DG, Prime, and others created in the U.S. in the late 1970s. Consequently, the products they sell in this market tend to be small versions of their mainframes, much like IBM has done with its 4300 machines.

But regardless of national origin, vendors of medium-scale systems have had a tough time over the last few years. The problems IBM has had with its 4300 and 9370s, along with the slump of companies such as DG, Prime, and Wang, are symptomatic of a worldwide trend. Perhaps the only bright spot for 1989 will be the market boost coming from IBM's AS/400s which appear to be well received in Japan where there is a large S/38 user base.

On a price/performance basis, medium-scale systems are often not competitive with what can be done with PCs, workstations or microprocessor-based small systems. Until this changes, medium systems will continue to be the slowest growing sector of the market.

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Historically, the volume of medium-scale OEM system traffic has been light. But IDC expects to see more activity over the next few years as demand emerges for higher performance Unix systems. Thus far, almost all of these deals have involved U.S. suppliers selling to U.S. or European firms, and it does not look as if any major increase in exports of Japanese Unix-based medium-scale machines is likely very soon. The Japanese also have been slow to develop multiprocessing medium-scale systems such as those from Tandem, Sequent, DEC (VaxCluster) and others.

Small Systems on the Rise

Of the three multiuser categories, the worldwide small systems market is perhaps the most homogeneous. It is also the area where the U.S. is least dominant. Among the key reasons:

- Until the advent of the 32-bit microprocessor, small systems were often not powerful enough for many serious business applications, and thus major suppliers put much more emphasis on large- and medium-scale platforms.

- With small systems, local factors such as support, distribution channels, and local language applications are often more important than the underlying platform, and this has given local suppliers a significant edge.

However, this environment is changing, and today small systems are taking on a much more important role in most major U.S. and Japanese vendors' strategic plans.

- Vendors have learned how a powerful small-system entry such as DEC's MVII can be the key to getting new accounts.

- As small systems become increasingly capable of doing work which once required a supermini or mainframe design, small systems have become the fastest growing multiuser segment.

- Because small systems will increasingly be used as file, compute, and communication servers on local area networks, they will become one of the key means to establish and maintain customer account control.

- Most of the new multiuser Unix technology such as RISC is emerging first in the small-systems arena.

All this activity is effectively recasting the role of the small system. Whereas in the past small systems were often an independent and subordinate line of products for most U.S. and Japanese suppliers, they are quickly becoming one of the lead components of most major vendors' integrated product strategy.

But just because the small systems market in Japan is behaving similarly to the U.S. market, it should not be assumed that significant Japanese export opportunities exist. Almost all new small-scale technology — essentially RISC and non-RISC microprocessors — resides in the U.S. and when this is coupled with the local advantages described above, the ***Gray Sheet*** concludes that the small-scale opportunity is presently the least attractive to Japanese suppliers looking at export options.

Conclusion

The term "relative competitiveness" can be a slippery thing to measure. By focusing on processor trends and directions, this discussion has cast the U.S. position in perhaps its most favorable light. U.S. companies continue to control the great majority of the world's computer customers, and should continue to do so for the foreseeable future. The U.S. retains a huge lead in both installed and emerging hardware and software. This gives U.S. companies a big edge in both time-to-market and account control.

However, if one looks at the underlying chip and peripheral technologies, the threat becomes more apparent. Should the U.S. cede component superiority, it may well be only a matter of time before customer bases are lost as well. As both hardware and software become more standardized, competitiveness at the

Written in conjunction with David Moschella, IDC vice president of Systems Research.

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'TIS THE SEASON TO CONSOLIDATE. Two happy (for a change) midrange takeovers and a software merger are in the news. STC PLC, the parent company of ICL in Britain, will pay approximately $168.4 million for the outstanding shares of Computer Consoles Inc. STC hopes the move will broaden its market base and improve its stature as a worldwide supplier — and give it a Unix springboard. In the other midrange action, Alpha Microsystems (AM) announced its intent to purchase cash-constrained General Automation (GA). AM intends to exchange each block of ten GA shares with one AM share. Finally, on the software front, Morino Systems and Duquesne have agreed to merge forces to better compete against giants like Computer Associates and (lest we forget) IBM. The transaction, to be accounted for as a pooling of interests, will create a data center management software company estimated to be worth $400 million.

AT&T BIG FTS 2000 WINNER. Ma Bell and U.S. Sprint will be building and subsequently running for the next ten years the Federal government's all-digital private network. The big loser was a joint MCI/Martin Marietta (MM) bid. AT&T's formula for success? According to IDC telecom analyst Steve Kropper, "Martin hired engineers; AT&T hired lawyers." Expect an MCI/MM appeal.

FAMILIAR FACES GONE FROM ARMONK. IBM, for reasons ranging from impending retirement to "longer runways," has seen two senior executives leave in the last few weeks. Armonk has used the departures to effect subtle changes in its organizational structure.

Kasper V. Cassani, in anticipation of his 60th birthday (mandatory retirement age for Big Blue), has resigned his position as vice chairman of the board and a member of IBM's powerful management committee. To fill Cassani's spot on the management committee, IBM has recalled C. Michael Armstrong from Europe where he has been serving as head of IBM World Trade EMEAC.

Also, William C. Lowe, president of the Entry Systems Division (ESD), left to head Xerox's manufacturing operations. Lowe's exodus is especially interesting in light of Armstrong's return from Europe. The fast track at IBM is believed to be greased by effecting special allegiances with senior "champions"; Armstrong has often been mentioned as Lowe's former patron. It is an indication of the pressure brought to bear on Lowe (and the scope of his opportunity at Xerox — the longer runway) that he left just as Armstrong was returning.

Richard Gerstner, head of IBM's Personal Systems Division, has decided to split the workstations line of business in two. James Cannavino, formerly a big wig in the S/370 side of the house, is now president of ESD. Nick Donofrio, who has held a number of senior positions in IBM's general technology operations, is now president of Advanced Workstations and responsible for the RT and all AIX activities. By creating a separate division for the RT, IBM may be sending a strong competitive message to the technical workstation market.

TOSHIBA GIVES UNIX FEET. The first System V/bsd 4.2 Unix laptop hails from Toshiba. The 80386-based machine sports a 40MB hard drive, a gas plasma display, and support for a variety of communications protocols including X/WINDOWS, RFS, and TCP/IP. For about $9K, up to four Unix software developers can code on the go.

AS OSF TAPS CEO. . . David Tory, the man some regard as the mastermind behind Computer Associate's phenomenally successfull acquisition record, has been named CEO at OSF.

. . . AT&T GROUP NAMED, GETS LEADER. The group of vendors committed to AT&T's Unix directions has decided to call itself UNIX International Inc. Details on the organization's structure, membership, and operating strategies are still not clear, but its purpose is: to guide the future development of AT&T's Unix System V operating system. To build the nascent organization, NCR Chairman recruited Donald J. Herman, retiring NCR senior executive and founding chairman of the Corporation for Open Systems.

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REVIEW & FORECAST PART II

THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR DECEMBER 9, 1988 • VOL. 24, NO. 11-12 PATRICK J. MCGOVERN, PUBLISHER

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What Will Emerge from the Molten Midrange?

For years industry maturity has been talked about and anticipated in the midrange computer market. But ultimately, when decisions had to be made and actions taken, most participants in the medium- and small-scale computer systems industry seemed to discount it as something to worry about in the future.

Always there was some new technology or "computing paradigm" around the corner that would hold the potentially ravaging effects of maturity in check and forestall the need for major strategic, organizational, and administrative adjustments on the part of minicomputer competitors.

But now, perhaps as never before, the competitive pressure is on in the midrange computer market. The tide of U.S. midrange shipment value the past three years has risen at a compound rate of less than 4%, not enough to lift all boats. The resultant squeeze on growth, profits, market shares, and cash is being felt from almost all sides. Consider these points:

- From below, the advent of PCs has already obsoleted most time-sharing technology in the office. Now that PC vendors are shipping powerful 80386-based systems with mass storage devices large enough, fast enough, and reliable enough to act as price-effective LAN process servers, the last stronghold of the departmental computer has come under siege. The anticipated introduction next year of the 80486 from Intel will make it easier for PC vendors to attack the midscale market.

- From the left and right, vendors that had been striving to develop defensible niches are discovering hungry competitors encroaching on their territories with increasing success. Most affected? Those specializing in the technical and OA markets.

- Some of the greatest pressure is on the inside. The old general-purpose minicomputer guard — DEC, DG, Wang, HP, and to a lesser extent, IBM — have spent a large amount of time and other resources targeting each other's installed bases and engaging in heavy price competition. A price-leadership action by IBM earlier this year may have momentarily stabilized the situation, but outside forces will upset the fragile truce.

- Of course, perhaps the single greatest source of change is outside: customers. In contrast to those of the past, today's customers generally are far more knowledgeable, have a larger range of choices, and face more fiscal constraints. As increasingly powerful buyers, they are forcing vendors to systematically lower switching costs through the adoption of emerging standards.

- The only side not exerting extreme pressure on the minimarket is the topside, the mainframe. Some vendors have apparently interpreted this to mean that the big growth opportunities are above, but few have successfully exploited this opportunity (if indeed one exists). Thus, while the mainframe may not be actively attacking minidom, it has acted like a lid on a pressure cooker.

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Combined, these competitive pressures have generated enough friction to impel a phase change in the midrange. The market's structure is melting, longstanding patterns of competitive behavior dissolving. In order for a company to compete in the evolving environment, its assumptions, product cycles, and strategic relationships must be fluid, changeable instantly in response to swirling market dynamics.

Some foresighted vendors are harnessing the energy radiating from the molten market and turning it to their advantage. Others are scrambling to keep their businesses from evaporating.

None continue to deny the significant secular change taking place. All are searching for sound strategic footing.

Between a Rock and a Hard Place

About a decade ago, the era of downsizing accelerated with the introduction of powerful midrange machines capable of performing most of the same functions as a much more expensive mainframe.

A number of technological innovations made this possible, including more efficient semiconductor memory, less power-demanding logic devices, and smaller mass storage devices that didn't sacrifice reliability. Midrange machines were not only cheaper to buy, but also, being smaller and air-cooled, didn't require the same expensive environmental support that most mainframes demanded.

Thus, when price or environmental constraints dominated power needs in purchase decisions (such as office or departmental), many turned to midrange solutions.

But the same technological imperatives that launched the midrange are now returning to haunt it. As mainframe technology has improved, today delivering throughput of over a hundred MIPS, most proprietary high-end midscale machines are topping out around 20MIPS.

There are notable exceptions, such as Tandem, but many feel that further great leaps in performance, while remaining true to existing architectures, may require more expensive packaging technologies.

Not that 20MIPS is lousy — indeed, in relative terms both mainframe and midrange have experienced similar performance improvements over the years. But it is no longer enough to provide the midrange with a distinctive competence.

Certain applications require the mega-performance of a mainframe. Others, the same ones that initially found favorable haven in the midrange, are once again being downsized, this time to microcomputers.

Squeezing Water from Stone

Unable to undercut mainframes with the same success, and embattled by evermore effective microprocessor-based substitutes, the growth of the midscale market value both here and abroad has slowed to a crawl. A few observations:

- Although the midscale retains the same portion of the worldwide multiuser market it had in 1982 (62%), its portion of the total worldwide market as a result of the PC explosion has slipped substantially. Whereas in 1982 it commanded about 53% of a total market of nearly $34.7 billion, in 1987 its share was just under 39% of $77.3 billion.

- The worldwide compound annual growth rate of the midrange since 1982 is 10.3%. But that primarily reflects the effects of one remarkable year, 1984, when growth reached nearly 27%.

- It was also in 1984 when talk of distributed midrange computing obviating mainframe technology reached a crescendo. Since 1984, the midscale market has grown at just under a 7% CAGR. The vogue is distributed microcomputers obviating midrange technology.

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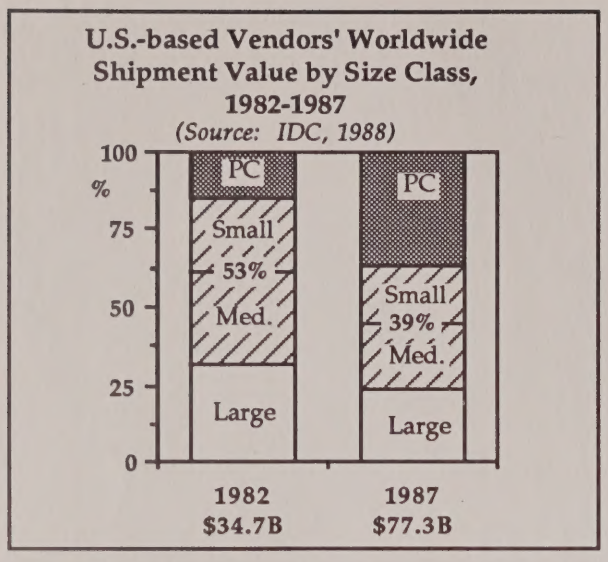

- U.S. demand looks even worse, having experienced barely greater than 3% CAGR since 1984. What the CAGR figure doesn't reflect is the volatility of the market: +8% in 1985; flat in 1986; +3% in 1987.

- While real demand overseas was stronger than here in the States, international sales greatly benefited from favorable currency exchange rates. Many U.S. vendors used the wacky currency situation to cut prices and increase shipment share. The net effect has been a 12% CAGR in shipment value since 1984 — about the same rate at which the dollar has fallen.

The prolonged softness in demand is forcing pricing and positioning strategies industrywide to be constantly reexamined. But the effects are not evenly felt.

The Bigger the Rock, the Less Water

The brunt of the downturn is being absorbed by the high end of the midrange, what IDC calls medium-scale systems, comprising traditional supermini-class computers and some machines classified by their vendors as small mainframes. Typically, these systems range from $100,000 to $1 million in price (including peripherals), and support 17 to 128 users in a normal commercial environment. Representative systems include IBM's 43XX, 9370, System/38, and larger AS/400 lines, the upper ranges of Digital's VAX series (including 6200 and 8XXX systems), and their competitors.

For two reasons, competition among medium-scale vendors has been particularly vicious. The first is that competition has always been

U.S.-based Vendors' Worldwide Value of Shipments
Medium-Scale Systems, 1983-1987
(Source: International Data Corporation, 1988)

	1983 M$	1983 Mkt%	1984 M$	1984 Mkt%	1985 M$	1985 Mkt%	1986 M$	1986 Mkt%	1987 M$	1987 Mkt%
IBM	2,960	29.0%	4,450	32.3%	4,740	31.9%	4,400	29.3%	4,400	27.6%
Digital	1,380	13.5%	2,630	19.1%	2,860	19.2%	3,060	20.4%	3,450	21.6%
Unisys	960	9.4%	1,030	7.5%	1,280	8.6%	1,350	9.0%	1,340	8.4%
HP	650	6.4%	850	6.2%	890	6.0%	900	6.0%	1,030	6.5%
Tandem	360	3.5%	450	3.3%	520	3.5%	620	4.1%	780	4.9%
Wang	180	1.8%	290	2.1%	400	2.7%	500	3.3%	540	3.4%
Prime	290	2.8%	360	2.6%	450	3.0%	470	3.1%	510	3.2%
Data General	440	4.3%	410	3.0%	430	2.9%	420	2.8%	400	2.5%
Hon. Bull	570	5.6%	450	3.3%	410	2.8%	400	2.7%	400	2.5%
Subtotal	7,790	76.4%	10,920	79.4%	11,980	80.6%	12,120	80.7%	12,850	80.6%
Other/3rd-Party Peripherals	2,410	23.6%	2,840	20.6%	2,890	19.4%	2,900	19.3%	3,100	19.4%
Total	**10,200**		**13,760**		**14,870**		**15,020**		**15,950**	

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U.S.-based Vendors' U.S. Shipment Value
Medium-Scale Systems, 1983-1987

(Source: International Data Corporation, 1988)

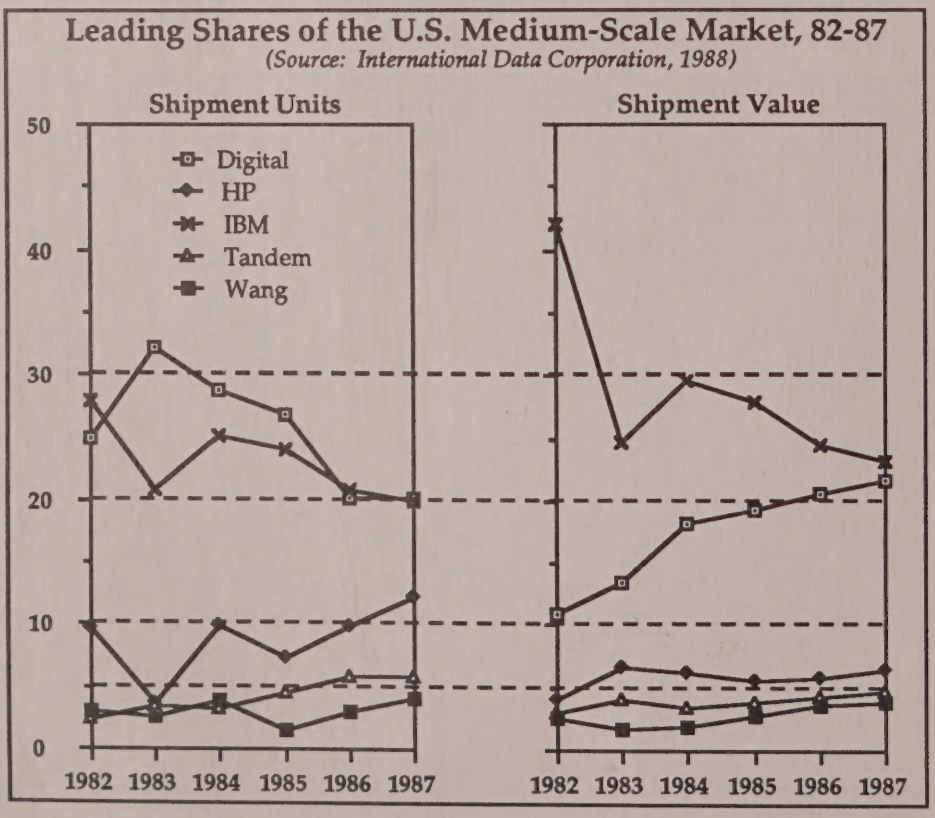
	1983 M $	1983 Mkt %	1984 M $	1984 Mkt %	1985 M $	1985 Mkt %	1986 M $	1986 Mkt %	1987 M $	1987 Mkt %
IBM	1,500	24.6%	2,540	29.7%	2,515	28.0%	2,100	24.4%	2,020	23.1%
Digital	830	13.6%	1,560	18.2%	1,730	19.3%	1,780	20.7%	1,900	21.7%
Unisys	520	8.5%	610	7.1%	710	7.9%	760	8.8%	730	8.3%
HP	400	6.6%	540	6.3%	500	5.6%	500	5.8%	560	6.4%
Tandem	250	4.1%	300	3.5%	340	3.8%	370	4.3%	410	4.7%
Wang	110	1.8%	170	2.0%	255	2.8%	310	3.6%	340	3.9%
Prime	160	2.6%	210	2.5%	240	2.7%	250	2.9%	260	3.0%
Data General	290	4.8%	280	3.3%	280	3.1%	260	3.0%	230	2.6%
Honeywell	280	4.6%	240	2.8%	240	2.7%	220	2.6%	210	2.4%
Subtotal	4,340	71.1%	6,450	75.4%	6,810	75.9%	6,550	76.3%	6,660	76.1%
Other/3rd-Party Peripherals	1,760	28.9%	2,100	24.6%	2,160	24.1%	2,040	23.7%	2,090	23.9%
Total	6,100	100.0%	8,550	100.0%	8,970	100.0%	8,590	100.0%	8,750	100.0%

vicious in the midrange.

For years midrange vendors like DEC, HP, Prime, and DG, careful not to arouse Big Blue, spent most of their time smacking each other. Even after IBM entered the market with the ill-fated 8100, most (DG's infamous advertisement welcoming IBM to the minicomputer market notwithstanding) continued to avoid direct confrontation with the pinstriped juggernaut, choosing instead to affront one another.

Eventually, of course, they were forced to accept Big Blue as an unequal. But IBM's presence did little to settle the situation.

The second reason, downsizing with its retarding effects on sales, only served to exacerbate the competitive tensions among medium-scale systems vendors. Faced with slow aggre-



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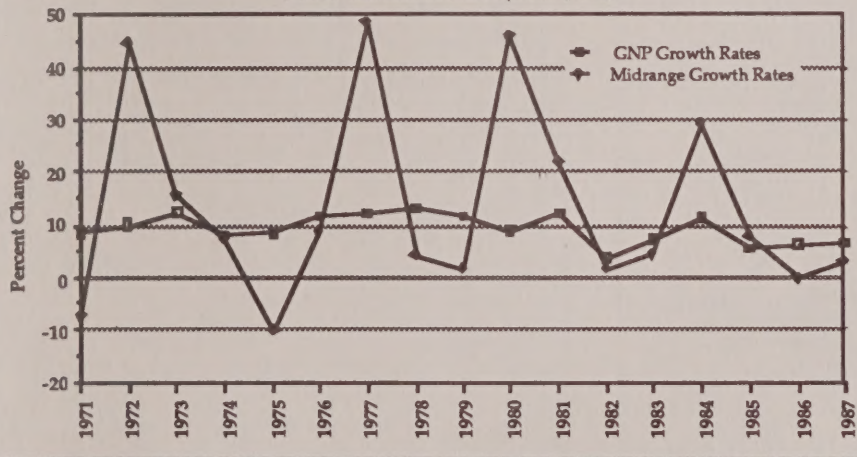
The Symptoms of Maturity

Evidence of secular change in the midrange is everywhere. A few primary examples:

•Slower, more regular growth patterns. In the past, there has been little, if any, correlation between GNP growth and changes in the value of U.S. midrange shipments. Rather than being dominated by general business spending fluctuations, technology cycles have proven to be the primary determinant of midrange growth. In recent years, however, U.S. midrange shipment value has more closely followed change in GNP. In the future, business spending cycles may exert more influence on expenditures for midrange systems.

Annual Changes in GNP and Value of the U.S. Midrange Computer Industry (Current Dollars), 1971-1987

(Source: International Data Corporation, 1988)



•An increasing emphasis on market share as a measure of success. Unable to fuel previous growth rates merely by matching industry growth rates, midrange firms have begun attacking each other's markets, partnerships, and installed bases. This is a situation likely to get worse before it gets better.

•Vendors are revamping resource allocation, costing, and marketing practices. Costs must be controlled and targeted. Product pricing must better reflect true production costs, which may lead to more industrywide product rationalization — and pricier software. (So this is what Ken means by "Digital is a software company.")

•Standardization. Customers are demanding that their midrange suppliers compete on the basis of costs and value-added service, and not lock-in.

These changes may engender great corporate pains. Industry economies have historically facilitated entrance into the market. This has been especially true this past decade as two primary cost barriers to entrance in the minicomputer industry — operating system development and cost of capital — were mitigated by the availability of Unix and relatively cheap venture capital, respectively.

The result is that no one company completely dominates the market. The influx of competing products and substitutes has led to a wide range of competitive styles and positionings. Market signals are scrambled and easily misinterpreted, heightening the competitive fervor.

As end-user switching costs are lowered, no one will be completely protected. In critical business areas such as R&D and cost of sales, many of the old guard, confronted everywhere by upstarts, have been forced to spend more just to stand still — and in some unfortunate cases, hold losses to a minimum.

The challenges fall squarely on the shoulders of top management. Changing expectations in financial performance, increased emphasis on cost discipline, adjustments in resource allocation, different rates of career advancement — all will create a greater-than-ever need for effective and consistent leadership.

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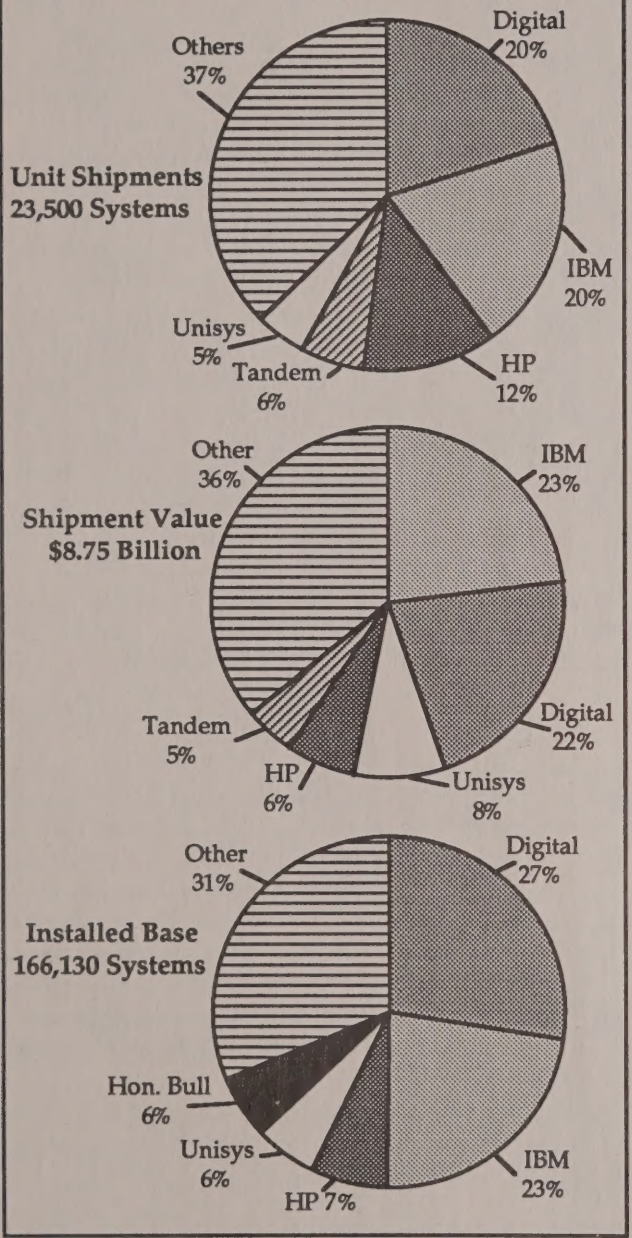
1987 Shares of the U.S. Medium-Scale Market

(Source: International Data Corporation, 1988)



Consolidation, MBF, and Prime

Prime's board recently rebuked MAI Basic Four's (MBF) very hostile takeover attempt. MBF argues that the move makes sense in a "rapidly" maturing industry. Prime maintains that it is well positioned to compete in any environment, and is more concerned with successfully integrating the assets it acquired earlier this year. Who's right?

Industry maturity usually implies a significant consolidation of productive capital. Companies behind the competitive eight ball, their assets undervalued, are acquired (usually) by larger firms, those with greater financial resources, or those seeking to improve a defensible position in a profitable niche.

Will consolidation take place in the mid-range? Academic arguments can be made supporting either a yay or nay, but the practical analyst observes a significant number of marginal players and must conclude that the industry is in for a trim.

Prime has anticipated as much. In mid-1985, the company searched for a buyer. Rebuffed in its quest, Prime subsequently undertook a major repositioning, expanding its identity in the CAD/CAM market through acquisition.

It is still too early to tell if Prime's strategies will be successful. A tremendous amount of work remains before Computervision is one with Prime. But this is certain: MBF's actions will make it more difficult. The combination would be debt-ridden, bloated, and unstable. From a strategic standpoint, it's a risky and unattractive idea.

gate growth, they initiated zero-sum game strategies, targeting each other's installed bases as possible sources of sales.

The direct results have been overwhelming strategic uncertainty, shifting market shares, and trouble in most medium-scale businesses. Vendors that have been comfortably selling to such specific markets as scientific/engineering have seen their businesses upended to the same degree as the market's traditional combatants.

Among the indirect results, two stand out: (1) customers, tired of sharing the burden of vendors' uncertainties, are demanding standards to lower switching costs; and (2) small-system sales have become much more important.

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MEDIUM-SCALE SYSTEM MARKET — U.S.-BASED MANUFACTURERS

(Source: International Data Corporation, 1988)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1982	37,700	131,240	10,050	47.9
1983	31,160	156,780	10,200	53.2
1984	43,960	191,330	13,760	63.5
1985	41,240	222,180	14,870	74.9
1986	34,000	249,230	15,020	84.5
1987	**41,730**	**278,360**	**15,950**	**95.0**
1988	44,400	310,000	16,450	105.8
1989	47,300	342,000	17,300	117.0
1990	49,700	374,000	18,200	126.2
1991	51,200	407,000	19,200	135.9
1992	53,400	440,000	20,200	145.9
		UNITED STATES		
1982	21,960	76,720	6,100	27.3
1983	18,520	92,150	6,100	31.7
1984	26,650	113,680	8,550	38.9
1985	25,760	133,160	8,970	46.8
1986	20,490	149,790	8,590	53.2
1987	**23,500**	**166,130**	**8,750**	**60.2**
1988	25,200	184,000	8,850	67.1
1989	27,000	202,000	9,200	74.5
1990	28,500	220,000	9,700	79.4
1991	29,000	238,000	10,300	84.5
1992	30,000	256,000	10,800	89.9
		INTERNATIONAL		
1982	15,740	54,520	3,950	20.6
1983	12,640	64,630	4,100	21.5
1984	17,310	77,650	5,210	24.6
1985	15,480	89,020	5,900	28.1
1986	13,510	99,440	6,430	31.3
1987	**18,230**	**112,230**	**7,200**	**34.8**
1988	19,200	126,000	7,600	38.7
1989	20,300	140,000	8,100	42.5
1990	21,200	154,000	8,500	46.8
1991	22,200	169,000	8,900	51.4
1992	23,400	184,000	9,400	56.0

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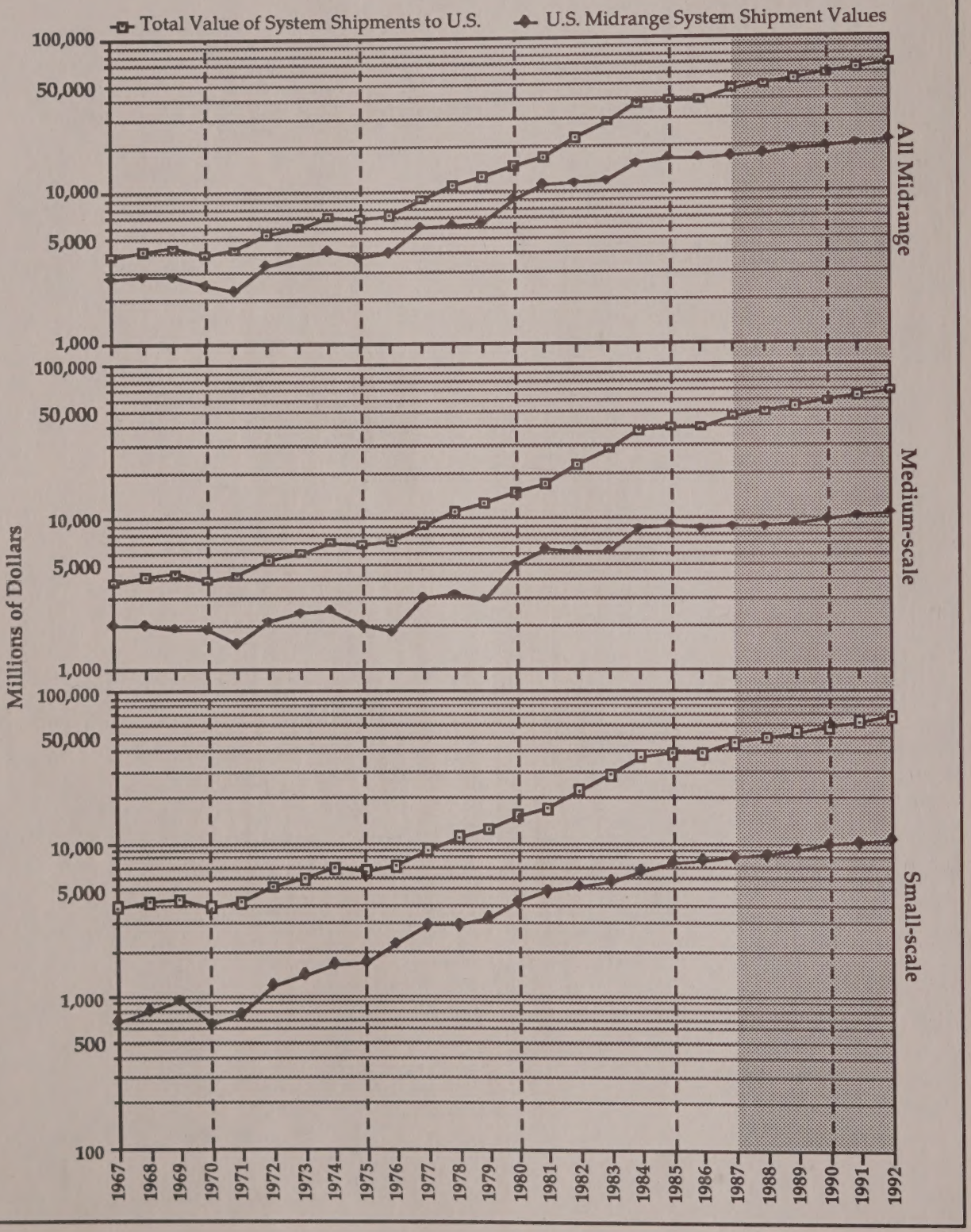
History and Forecast of U.S.-based Manufacturers' Total vs. Midrange U.S. Shipment Values, 1967-1992

(Source: International Data Corporation, 1988)



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MIDRANGE SYSTEMS MARKET — U.S.-BASED MANUFACTURERS

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1982	292,020	1,346,570	18,200	89.8
1983	291,120	1,602,470	19,330	101.2
1984	395,890	1,944,250	24,500	119.3
1985	371,380	2,251,510	26,930	137.1
1986	365,820	2,560,900	27,950	153.1
1987	**423,400**	**2,896,150**	**29,750**	**170.4**
1988	450,400	3,258,000	30,950	188.6
1989	481,300	3,623,000	32,900	208.1
1990	511,700	4,003,000	35,000	226.5
1991	549,200	4,403,000	37,000	244.9
1992	578,400	4,813,000	38,800	264.4
		UNITED STATES		
1982	180,840	854,760	11,270	52.3
1983	190,490	1,021,850	11,790	60.6
1984	268,990	1,255,390	15,220	72.6
1985	244,820	1,459,890	16,395	84.8
1986	228,480	1,647,860	16,350	94.9
1987	**247,040**	**1,841,230**	**16,850**	**105.8**
1988	261,200	2,049,000	17,150	117.0
1989	281,000	2,257,000	18,200	129.5
1990	298,500	2,472,000	19,400	140.2
1991	317,000	2,696,000	20,500	150.5
1992	337,000	2,929,000	21,600	161.9
		INTERNATIONAL		
1982	111,180	491,810	6,930	37.5
1983	100,630	580,620	7,540	40.6
1984	126,900	688,860	9,280	46.7
1985	126,560	791,620	10,535	52.3
1986	137,340	913,040	11,600	58.2
1987	**176,360**	**1,054,920**	**12,900**	**64.6**
1988	189,200	1,209,000	13,800	71.6
1989	200,300	1,366,000	14,700	78.6
1990	213,200	1,531,000	15,600	86.3
1991	232,200	1,707,000	16,500	94.4
1992	241,400	1,884,000	17,200	102.5

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SMALL-SCALE SYSTEM MARKET — U.S.-BASED MANUFACTURERS

(Source: International Data Corporation, 1988)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1982	254,320	1,215,330	8,150	41.9
1983	259,960	1,445,690	9,130	48.0
1984	351,930	1,752,920	10,740	55.8
1985	330,140	2,029,330	12,060	62.2
1986	331,820	2,311,670	12,930	68.6
1987	**381,670**	**2,617,790**	**13,800**	**75.4**
1988	406,000	2,948,000	14,500	82.8
1989	434,000	3,281,000	15,600	91.1
1990	462,000	3,629,000	16,800	100.3
1991	498,000	3,996,000	17,800	109.0
1992	525,000	4,373,000	18,600	118.5
		UNITED STATES		
1982	158,880	778,040	5,170	25.0
1983	171,970	929,700	5,690	28.9
1984	242,340	1,141,710	6,670	33.7
1985	219,060	1,326,730	7,425	38.0
1986	207,990	1,498,070	7,760	41.7
1987	**223,540**	**1,675,100**	**8,100**	**45.6**
1988	236,000	1,865,000	8,300	49.9
1989	254,000	2,055,000	9,000	55.0
1990	270,000	2,252,000	9,700	60.8
1991	288,000	2,458,000	10,200	66.0
1992	307,000	2,673,000	10,800	72.0
		INTERNATIONAL		
1982	95,440	437,290	2,980	16.9
1983	87,990	515,990	3,440	19.1
1984	109,590	611,210	4,070	22.1
1985	111,080	702,600	4,635	24.2
1986	123,830	813,600	5,170	26.9
1987	**158,130**	**942,690**	**5,700**	**29.8**
1988	170,000	1,083,000	6,200	32.9
1989	180,000	1,226,000	6,600	36.1
1990	192,000	1,377,000	7,100	39.5
1991	210,000	1,538,000	7,600	43.0
1992	218,000	1,700,000	7,800	46.5

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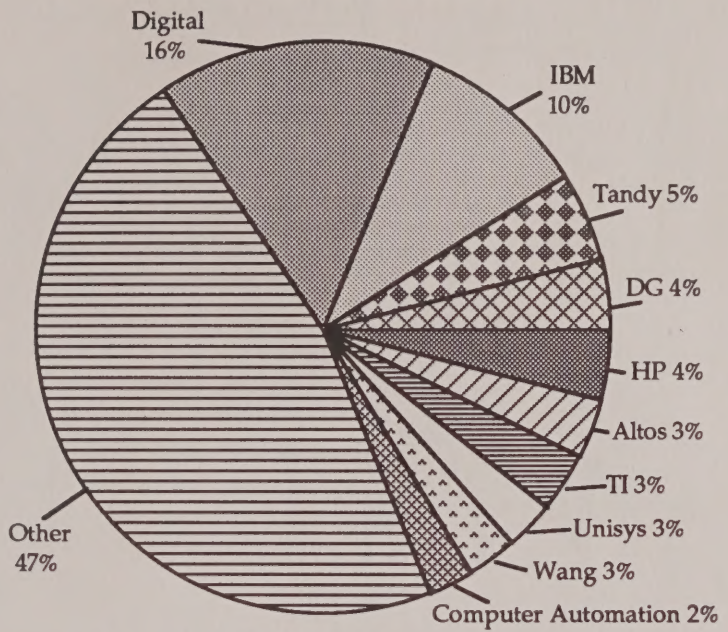
Shares of the U.S. Installed Base of Small-Scale Systems, 1987

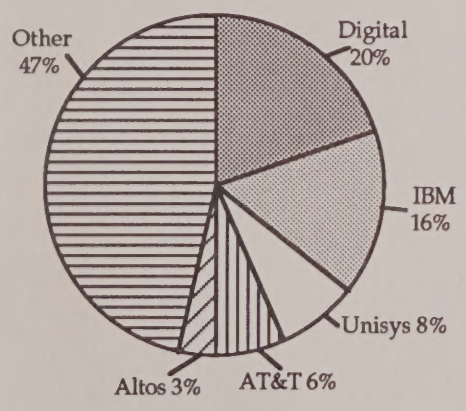
(Source: International Data Corporation, 1988)



1,675,100 Systems

1987 Unit Shipment Shares of the U.S. Small-Scale Systems Market

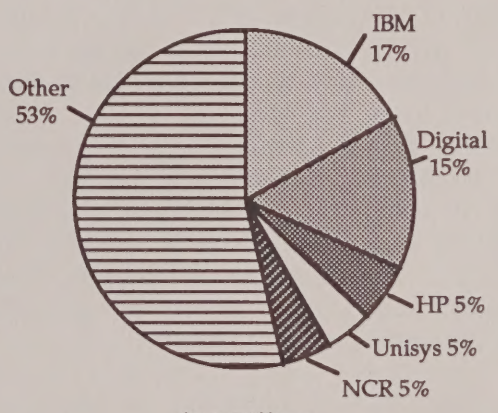
(Source: International Data Corporation, 1988)



223,540 Systems

1987 Value of Shipment Shares of the U.S. Small-Scale Systems Market

(Source: International Data Corporation, 1988)



$8.1 Billion

Knee High to a Power Supply

IDC defines small-scale systems as those which typically support two to sixteen users in a commercial environment. Average system values generally range from $10,000 to $100,000, including basic peripherals. Representative systems include smaller VAX systems from Digital; System/36, low-end AS/400, and RT models from IBM; and multiuser microprocessor-based systems from Altos, NCR, et al.

How important has this group's sales become to midrange vendors? A look at a decade of the leader's performance is ample proof.

Between 1978 and 1988 (estimated), Digital's shipments of VAX MIPS (VAX 11/780 equivalents) has grown at a CAGR of about 84%. Initially, this resulted from the strong

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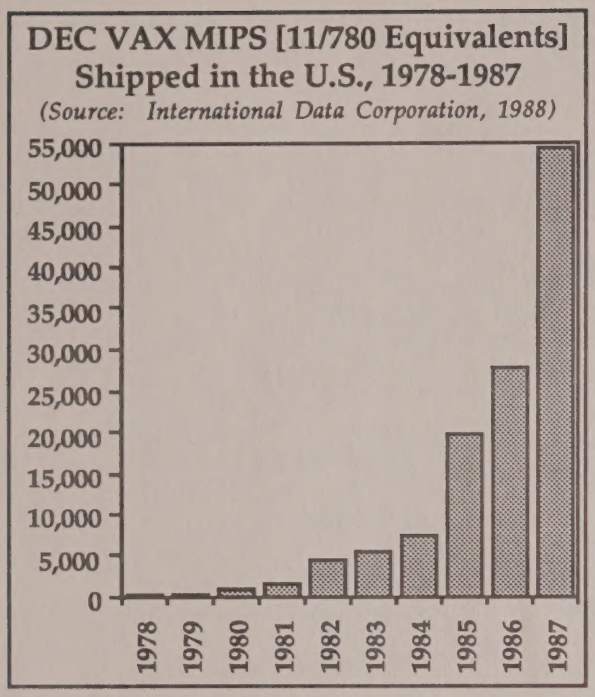
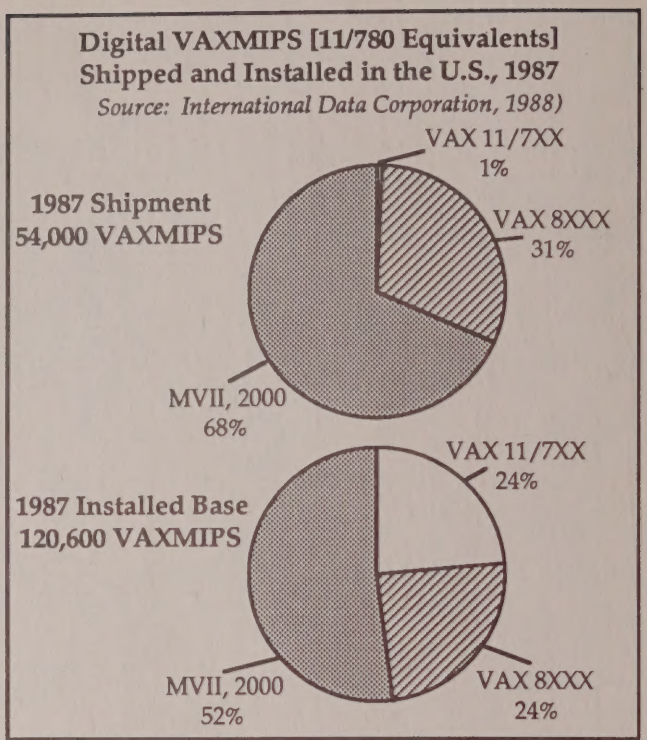


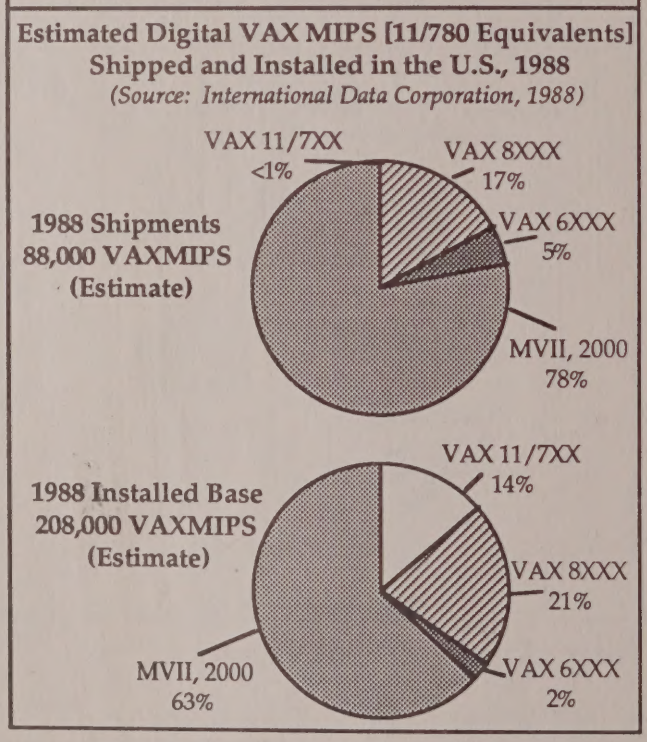
ramp of the original VAX machine, the 11/780. But since 1984, most of this growth has been driven by smaller systems.

Of the 54,000 VAXMIPS shipped to the U.S. by Digital in 1987, nearly 70% were in smaller-scale MicroVAX-class machines. In fact, a look at the data reveals the degree to which Digital's 8XXX sales have been soft. Not until 1987 did 8XXX VAXMIPS installed surpass much older VAX 11/7XX VAXMIPS installed. In terms of shipment value, Digital's smaller-system ships to the U.S. in 1987 accounted for 39% of DEC's total, up from 29% in 1984. Some of the high end clearly has not been turning over, but stepping down.

In 1988, IDC anticipates that the trend will continue. The 13.6% sequential quarterly drop in DEC's product sales was primarily ascribed to "below expectation" high-end sales. Estimates have the MicroVAX machines accounting for nearly 78% of VAXMIPS shipped, and the 8XXX family only 17%.

Just as early medium-scale systems stole sales from mainframes, so have small-scale systems stolen from the medium-scale. And for much the same reasons: simpler environmental requirements and price/performance.





The chief technology responsible has been the microprocessor. In 1981, proprietary chip sets were at the heart of 82% of small-scale systems shipped to the U.S. By 1983 that figure had fallen to 54%. Since then, interestingly enough, the proportions have stayed relatively stable.

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U.S.-based Vendors' Worldwide Value of Shipments
Small-Scale Systems, 1983-1987

(Source: International Data Corporation, 1988)

	1983 M$	1983 Mkt%	1984 M$	1984 Mkt%	1985 M$	1985 Mkt%	1986 M$	1986 Mkt%	1987 M$	1987 Mkt%
IBM	1,410	15.4%	2,220	20.7%	2,700	22.4%	2,700	20.9%	2,630	19.1%
Digital	1,040	11.4%	1,090	10.1%	1,390	11.5%	1,950	15.1%	2,180	15.8%
HP	740	8.1%	720	6.7%	780	6.5%	830	6.4%	880	6.4%
Unisys	570	6.2%	730	6.8%	820	6.8%	830	6.4%	870	6.3%
NCR	330	3.6%	520	4.8%	570	4.7%	640	4.9%	800	5.8%
Wang	360	3.9%	250	2.3%	380	3.2%	430	3.3%	480	3.5%
Data General	280	3.1%	420	3.9%	390	3.2%	370	2.9%	380	2.8%
Hon. Bull	120	1.3%	190	1.8%	230	1.9%	270	2.1%	280	2.0%
Texas Instr.	310	3.4%	300	2.8%	250	2.1%	210	1.6%	220	1.6%
Prime	100	1.1%	120	1.1%	110	0.9%	130	1.0%	150	1.1%
Subtotal	5,260	57.6%	6,560	61.1%	7,620	63.2%	8,360	64.7%	8,870	64.3%
Other/3rd-Party Peripherals	3,870	42.4%	4,180	38.9%	4,440	36.8%	4,570	35.3%	4,930	35.7%
Total	**9,130**		**10,740**		**12,060**		**12,930**		**13,800**	

U.S.-based Vendors' U.S. Value of Shipments
Small-Scale Systems, 1983-1987

(Source: International Data Corporation, 1988)

	1983 M$	1983 Mkt%	1984 M$	1984 Mkt%	1985 M$	1985 Mkt%	1986 M$	1986 Mkt%	1987 M$	1987 Mkt%
IBM	870	15.3%	1,420	21.3%	1,640	22.1%	1,500	19.3%	1,380	17.0%
Digital	550	9.7%	640	9.6%	880	11.9%	1,100	14.2%	1,200	14.8%
HP	450	7.9%	400	6.0%	410	5.5%	440	5.7%	440	5.4%
Unisys	330	5.8%	260	3.9%	370	5.0%	375	4.8%	370	4.6%
NCR	140	2.5%	260	3.9%	290	3.9%	320	4.1%	370	4.6%
Wang	200	3.5%	160	2.4%	230	3.1%	280	3.6%	280	3.5%
Data General	190	3.3%	320	4.8%	300	4.0%	260	3.4%	200	2.5%
Honeywell	40	0.7%	90	1.3%	120	1.6%	140	1.8%	130	1.6%
Texas Instr.	200	3.5%	200	3.0%	170	2.3%	145	1.9%	140	1.7%
Prime	80	1.4%	80	1.2%	70	0.9%	80	1.0%	80	1.0%
Subtotal	3,050	53.6%	3,830	57.4%	4,480	60.3%	4,640	59.8%	4,590	56.7%
Other/3rd-Party Peripherals	2,640	46.4%	2,840	42.6%	2,945	39.7%	3,120	40.2%	3,510	43.3%
Total	**5,690**		**6,670**		**7,425**		**7,760**		**8,100**	

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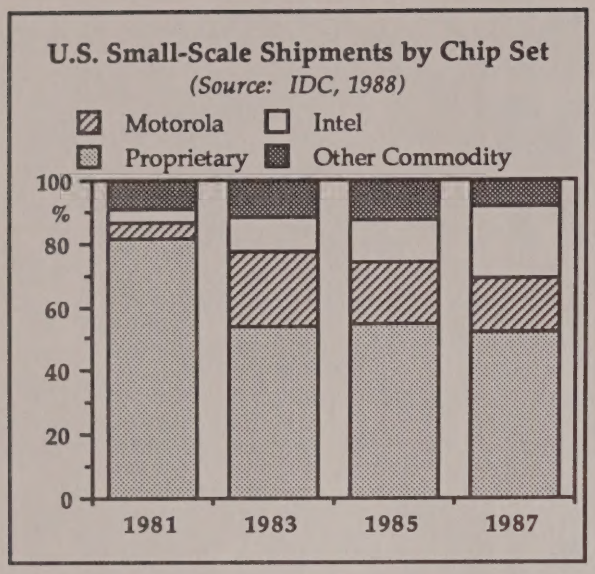
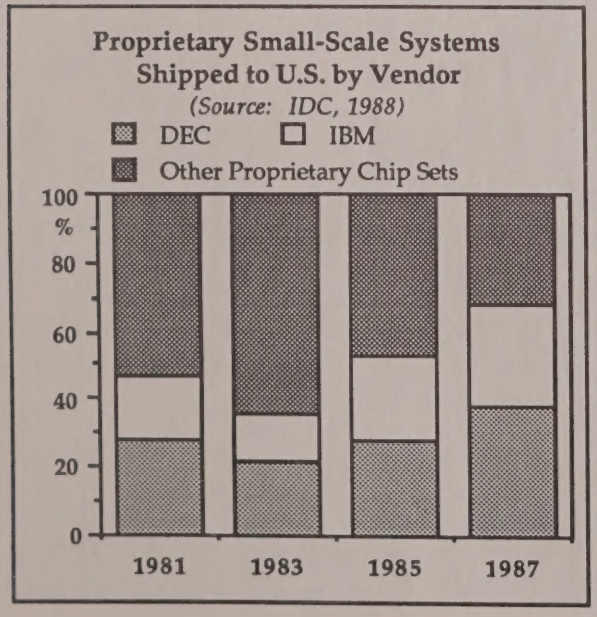


Shipment value proportions have shifted less markedly. In 1981, proprietary CPUs generated 89% of the U.S. small-scale shipment value. By 1983 the proprietary share had dropped only 15%, to 74% of the U.S. market, but has since remained relatively stable.

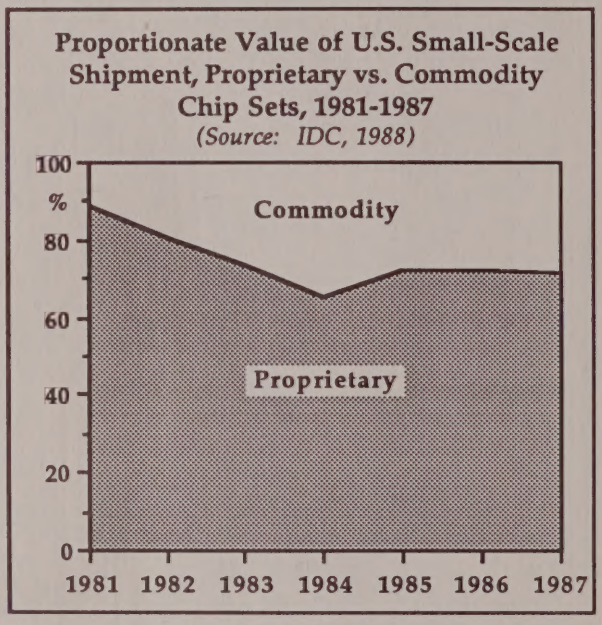
What has, on the one hand, kept proprietary unit-shipped proportions stable since 1983, and, on the other, supported the proprietary share of shipment value is the success of DEC's MicroVAX and IBM's S/36 families. Non-IBM and Digital sources of proprietary small-scale systems have seen their proportion of the market fall precipitously. In 1981, these vendors



accounted for 43% of all U.S. small-scale system unit shipments. In 1987, only 17% of the market originated among them.

But that's not to say that all one needs to do is build one's small-scale system with a standard microprocessor to guarantee big bucks. Worldwide, the value of the small-scale systems market, also feeling the effects of downsizing, has grown only 9% compounded annually since 1984. The U.S. has fared worse: 7% growth since 1984.

When viewed from the standpoint of unit shipments, the picture appears even uglier, especially in the U.S. Worldwide small-scale system unit shipments have grown only 3% per



annum since 1984. In the same time frame, U.S. unit shipments have actually dropped at a rate of 3% compounded annually.

The New Foundation

The technological twist now threatening small-scale (and medium-scale) multiuser time-sharing systems is the concept of the process server, a computer configured to service the shared data needs of a group of personal workstations.

It is around the idea of the server that the midrange market is beginning to coagulate. Two

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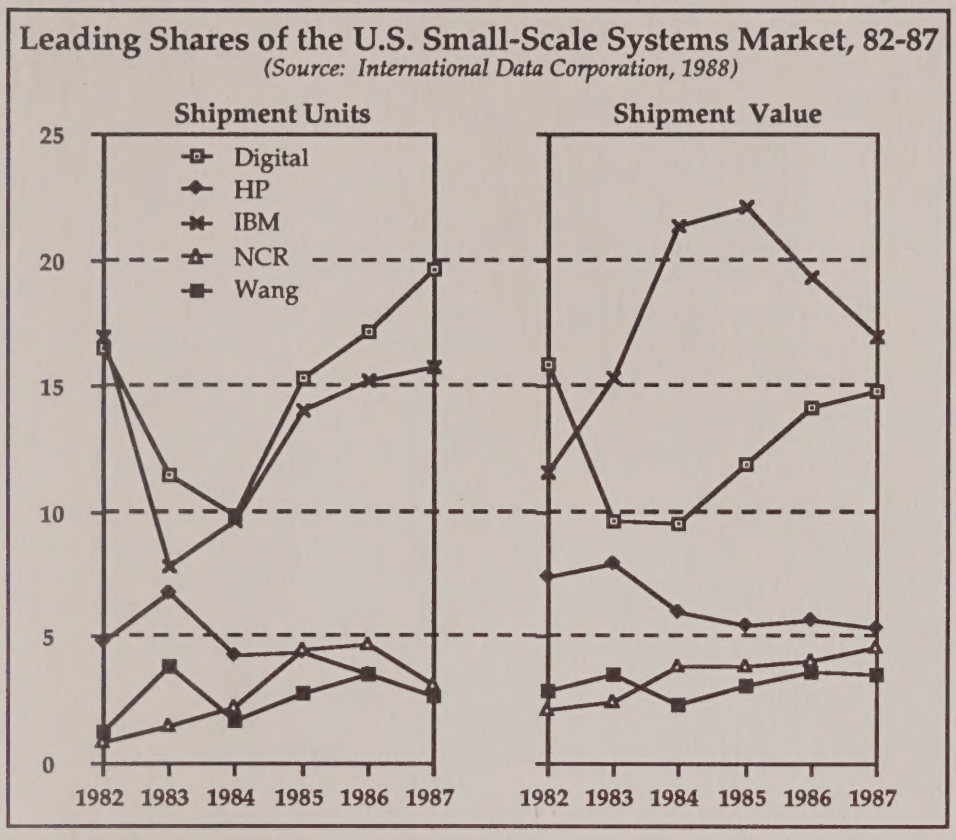

strategic poles are forming in the midrange soup, one for selling high-value-added time-sharing technology to new markets, the other for high-volume sales on the basis of price/performance.

Vendors are displaying a general tendency to behave in accordance with one pole or the other. Thus we might say that IBM and Digital are interested in selling their solutions directly to small businesses in tight cooperation with business partners, and that Altos and NCR are interested in selling indirectly via third-parties or huge MIS customers who then move systems to the ultimate end user.

But most midrange vendors will experiment with different product, channel, and market positionings until the mix best fitting the company's capabilities is found. Strategies are, after all, the stuff of abstractions, and are subject to enormous change as events become more concrete.

The value-added strategy is predicated on devising sales and marketing tools to reach and exploit emerging growth markets where avoiding risk is a primary purchase criteria (such as small business and transaction processing). The assumption seems to be that the cost curves of selling midrange solutions will favor vendors able to vertically integrate as much of the value as possible.

The price/performance strategy primarily differs in that it assumes the value-added chain is best serviced by less centrally coordinated means, and that the cost curves of selling midrange systems will favor volume producers. In effect, it creates the potential for each horizontal level of the value chain to be produced as a commodity.

Efficiently linking the chain together, however, absolutely requires that technological standards be in place. Absent standards, the process of integrating solutions via a market mechanism would entail enormous risks for both supplier and buyer. And because risk makes buyers want to pay less and suppliers charge more, these risks may perhaps be high enough to preclude the price/performance strategy from many potential growth markets.

Moreover, standards are prerequisite to volume-oriented producers enjoying an advantage over vertically integrated suppliers. Without a large base of nearly identical configurations to service, marginal costs might not be driven down to a competitive point.

These last two points, taken together, are why Unix has become the single most important buzzword in the midrange since "standard microprocessor."

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Emerging Strategies in the Midrange

(Source: International Data Corporation, 1988)

Strategy	Strategic Objectives	Tactics	Examples
New or Existing Growth Markets	Higher margins. Exploit mature hardware technologies by selling more complete solutions.	Tailor value-added efforts to meet needs of potential growth markets.	IBM DEC Tandem
Price/Performance	Build market share. Undercut proprietary pricing structures with standard system components.	Build reliable, low-cost supplier and distribution networks.	NCR Sun* Unisys Compaq*
Survival	Sustain and manage positive cash flow. Reposition company to exploit capabilities.	Incremental sales to existing customers (may include acquisition of other's assets/IBs): • upgrade product lines • offer peripheral products and services Improve product costing and line rationalization.	DG Prime Wang

*In anticipation of small-scale server systems.

Crystal Balling

Certainly, both strategies will obtain, but the question is: In what ratios? Will the market under maturity continue to pay a premium to monolithic suppliers able to provide an ever more complete (and captive) solution? Or will it tend to buy product, program, and service "commodities" and plug them together?

On an aggregate industry scale, the historical trend favors the price/performance strategy. From mainframe, through medium, to small, the curse of downsizing inexorably marches, wreaking havoc along the way.

And in spite of the prognostications of Armonk and Maynard — about customers demanding total solutions — Unix continues to comprise a growing segment of the market. The well-publicized nationwide breach of Unix security may momentarily temper corporate America's waxing enthusiasm for Unix, but the fact remains: in 1987, Unix, starting from a smaller base, grew over 21% while the rest of the market grew 4.5%.

Which probably explains the formation of the Open Software Foundation. IBM and DEC are not so unwise as to place all their eggs in one basket.

Still, within a given market, from IBM in the large-scale market to DEC in the midrange, the value-added strategy has had great success. A most important indicator is nearly upon us. Historically, midrange shipment value, dominated by IBM's and DEC's medium-scale numbers, has tracked a five-year growth cycle characterized by a year or two of strong growth followed by three years of much slower growth.

This year, 1988, is the fifth year of one such cycle beginning in 1984. It could be, on the basis of new products from IBM (large AS/400s and the follow-on to the aging 4381 line, the "4391") and DEC (Aridus, see the ***Gray Sheet*** 24:4, July 22, 1988) that 1989 will be a big year for shipment value in the midrange.

But while the past is prologue, it does not necessarily repeat itself. Occasionally history wrinkles, and events seem collectively to take altogether new forms. Chances are, the midrange is in the midst of such a discontinuity.

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THE GRAY SHEET
Computer Industry REPORT

PETER L. BURRIS, EDITOR NOVEMBER 18, 1988 • VOL. 24, NO.10 PATRICK J. MCGOVERN, PUBLISHER

Second excerpt from "The Computer Industry Report's IBM Strategy Book."

IBM's Software Opportunities are Rock Solid

For many years the independent software vendor community has achieved great success selling against IBM. It has criticized the giant hardware manufacturer's software pricing schedules and claimed that IBM cluttered programs with superfluous code to force users onto larger hardware platforms. In short, it has questioned IBM's ability and ultimately its desire to deliver truly competitive program products to users.

IBM, for its part, did little to avoid the barbs heaved its way. Software sales were secondary to hardware sales. Each of the many individual hardware groups maintained responsibility for developing software to run on its platform. As needs were determined, programs were developed or functions added to existing programs. The result is a massive hodgepodge of code written by different developers committed to different purposes at different times. The complexity of IBM's software portfolio has been reflected at user sites in the form of runaway software costs.

Nevertheless, during a time of paltry hardware revenue growth, IBM's program revenues have exhibited impressive growth over the past few years. Many forces are, of course, at work. But not the least of them is IBM's recognition of the growing central importance of software as both differentiating feature of, and dollar component in, the complete system sale. Consider the following:

- Program products (as IBM refers to its commercial software offerings) in 1987 accounted for approximately 13% of IBM's total worldwide revenue. As recently as 1984, IBM's program products generated only 7% of gross income. Since 1984, Big Blue's worldwide software revenues have grown at a compound annual rate of 29%. In contrast, total worldwide information handling business grew at a 5% per annum clip.

- According to IDC estimates, operating systems programs (MVS, VTAM, DFP,) and associated utilities software (transaction processing monitors, performance monitors, security packages) revenues, buttressed by IBM's near-monopoly position in the market, have experienced a 32% compound annual growth rate (CAGR) since 1982 — most of it S/370-related. The MVS-to-MVS/XA transition fueled phenomenal growth in the 1983-1985 time frame. Since then, it has tapered a bit, but the migration to MVS/ESA should once again drive strong growth in this area.

- In the 1980s, the fastest growing segment of IBM's software business has been its database and software tools (report writers, spreadsheets, fourth-generation languages) component. IDC believes IBM's program tools revenues have grown at a compound rate of 38% since 1982.

- Confronted by strong competitive products from the independent software community, IBM's program solutions (word processing, general ledger) business has performed less spectacularly — 20% CAGR since 1982. However, IBM has specifically targeted this area for strong growth. Two spots being especially emphasized are integrated office systems (IOS) and materials resource planning (MRP).

Certainly, IBM will be hard pressed to continue growth of this magnitude in software. Twenty percent revenue contribution is years

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away. Indeed, program revenues for the first nine months of 1988 increased just over 16%. It is not unlikely that, for the 1988 financial year, program revenue gains may only be 13-15% relative to 1987.

However, IBM is in the midst of a major restructuring of its software operations. Instead of annually throwing hundreds of programs at the market to see which would stick, Armonk seems intent on coordinating its diverse software activities to increase software quality and profit. If IBM is successful in this endeavor, software revenues are likely to grow faster in the future.

The Software Centerpiece: SAA

On March 17, 1987, in answer to all the complaints about its pandemonium of incompatible lines, IBM unveiled the Systems Application Architecture. SAA moves from the communications environment of SNA to the applications that users buy computers to run.

There are three components in SAA. Common Programming Interface will apparently require years for the full dimensions to reveal themselves. Common Communications Support is based mostly on current SNA offerings with the addition of recently announced products for OSI support (see the *Gray Sheet*, 24:8, Oct. 13, 1988). Common User Access is mostly in place after the Halloween introduction of Presentation Manager. Together they are supposed to provide a platform for common application spanning IBM's PS/2, S/3X, and S/370 systems.

IBM has called the 1987 announcement of SAA "the beginning of a long-term strategy similar to the process that has implemented IBM Systems Network Architecture (SNA)." And like SNA, SAA is consistency on IBM's terms: it is designed for intravendor conformity, not intervendor.

But still, because the specifications must be public for software developers, many hardware rivals may be tempted to introduce SAA hooks the same way they offer SNA gateways. Ideally SAA will make the job of application programmers (though not system programmers) much easier, since they would be working with the SAA layers common to IBM's major architectures. Even if it doesn't quite reach the ideal, SAA could nevertheless help check the dreaded Software Backlog monster. This is likely to be the most important lure for users to move to SAA.

The revolution will by necessity be piecemeal. For example, IBM preannounced that RPG would be part of SAA, but couldn't officially announce it due to a policy requiring that SAA components be deliverable as well-defined products within two years. The RPG announcement finally came with the unveiling of the AS/400, but by then IBM executives were hinting that the two-year goal was becoming a general one rather than a hard-and-fast promise.

Hard Changes in Software

Still, IBM has time to deliver SAA. Its opportunity in software stems from the fact that the software industry, reflecting events elsewhere in the information technology marketplace, is in the midst of radical change. These changes go a long way towards diminishing the importance of whatever disadvantages IBM may have had to cope with previously.

To be sure, as the preeminent provider of hardware, IBM, using SAA specifications, is in excellent position to influence how and at what rate these changes take place. In general, three trends seem most apparent:

- On a global, industrywide scale, downsizing has radically altered the economies of the computer business; software has become and will continue to be a viable business opportunity for traditional systems providers.

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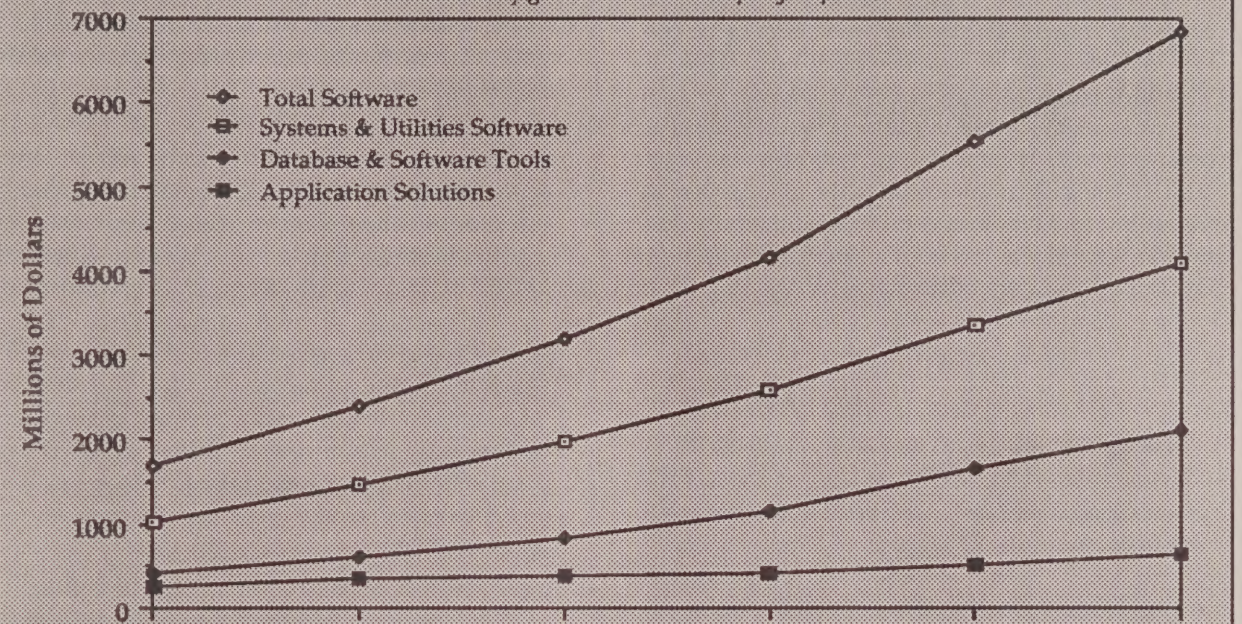
IBM's Worldwide Software Revenues by Software Class, 1982-1987

(Sources: program class revenue figures — International Data Corporation, 1988 total revenue figures — IBM company reports)



	1982	1983	1984	1985	1986	1987
Sys/Util	1,017	1,464	1,982	2,600	3,364	4,102,
Tools	424	600	831	1,150	1,654	2,098
Solutions	254	336	384	415	496	636
TOTAL	1,695	2,400	3,197	4,165	5,514	6,836

- Technological innovation has turned the market's attention to the possibilities of distributed and synergetic software running across a variety of hardware platform sizes and shapes.

- The relative cost relationships of the software industry are shifting. Maintenance and support costs appear to be rising faster than cost of sales or new development. This is certainly the case at IBM where customers are not always willing to migrate to IBM's preferred software environments.

The "old" software industry is characterized by high customer switching costs, a relatively stable technological foundation, a sense for the "right" strategic approach (usually differentiation), and a rather well-informed group of repeat buyers (namely traditional MIS). The rules of the competitive game are well established in the old software industry.

The "new" software industry, however, is characterized by standardized software interfaces that lower switching costs; new software technologies like relational DBMS, CASE, and program-to-program communications; complete confusion as to the most appropriate strategic approach and a willingness on the part of major providers to experiment; and a whole class of new, and powerful, first-time buyers — end users.

There are no rules of the game in the new software industry: pricing structures will be redefined, channels will be restructured, service agreements will be rewritten, resources will be redeployed. IBM hopes to shape the new rules of competition to accentuate IBM's competitive strengths.

Often IBM is characterized as an aircraft carrier attempting to change course. Its leadership, and others, point to the difficult of get-

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ting something so large to redirect itself quickly.

Something else may be afloat. True, the computer industry's smaller vessels may be observing a change in position relative to IBM — be it hardware vendor, software house, or service provider — and assume that Big Blue is coming about. What may not be observed is a concurrent shift in absolute position relative to customers and other competitors. Captain Akers, his mates, and crew are attempting to stay the course, and rotate the ocean.

Hard Dollars in Software

Five goals appear to be driving all of IBM's software-related behavior, from captive S/370 operating systems business to competitive applications business. They are:

- Integrate and better manage IBM's internal software development activities.
- Streamline IBM's software portfolio by stabilizing program products in markets for which IBM systems are less well fit.
- Expedite the development, promulgation, and IBM internal and external diffusion of Systems Application Architecture, IBM's proprietary software platform.
- Pursue and capture "Best of Breed" applications from independent sources for those markets well suited to IBM systems, but not properly exploited by current IBM program products.
- Craft an "IBM Way" in the software industry.

Each of these points deserves further discussion:

1. Integrate and better manage IBM's internal software development activities. To counter potential low-cost thrusts from competing hardware manufacturers, IBM has expended nearly $22 billion on capital improvement since the early 1980s.

However, while IBM's hardware economies are among the best in the industry, software development, maintenance, and support at IBM are a resource black hole. Redundancy of function, activity, and skills throughout IBM has led to tremendous inefficiencies in software "production."

In response, IBM has been creating software-only business entities charged with managing all cross-system development. One, the Application Systems Division, was created in July of 1987 for the purpose of integrating development and marketing of SAA applications. The second, Programming Systems (PS), was created in April of 1988 to oversee the development of all application development software, such as database and related tools. Together, they represent IBM's organizational play to be at least a — if not the — low-cost provider in the software industry.

This point could be restated in terms of opportunity cost of capital. Having already modernized much of its plant, IBM's opportunity cost of capital has dropped significantly. Coupled with high software revenue growth (especially relative to hardware growth), this has made investment in software production very attractive (i.e., less risky). ASD and PS are the two vehicles by which means software investments will be managed.

2. Streamline IBM's Software Portfolio. IBM has a severe software portfolio management problem. The company currently offers in excess of 3,000 program products. In the last two years, more than 70% of IBM's new product releases have been software programs. To keep IBM's SAA solutions messages from being diluted, ASD will choose from IBM's software portfolio those applications best suited to compete in chosen markets, and will develop consistent versions for other SAA platforms. Others will be stabilized.

3. Expedite the development, promulgation, and diffusion of SAA. SAA is an IBM-defined collection of protocols, interfaces, and working rules or conventions for software and software development. Together, PS and ASD are re-

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sponsible for getting IBM's internal and independent software developers, and large customers to play SAA ball.

Reflecting this commitment, on each of IBM's strategic platforms a common software vision is taking shape. Whether implemented on S/370s running VM or MVS, AS/400s, or PS/2s running OS/2, the SAA model calls for common database and communications functions to better support portability of applications and user skills. IBM's low-cost software strategy hinges on its success in popularizing this model.

4. Pursue and capture "Best of Breed" applications from independent sources. For non-strategic applications, IBM will "do marketing and financial deals" with third parties. It has been intimated that as much as 50% of these software deals will likely be with users. IBM's goal is to establish a modus operandi that will regularly bring a new application to market under the IBM name within 60 to 90 days of a recognized need. Once again, an industrywide subscription to SAA is critical; without widespread SAA support, the time it would take for IBM to rewrite applications to comply with SAA would make this goal unreachable.

5. Craft an "IBM way" in the software industry. IBM's reputation in the software market is, put nicely, not what it could be. IBM wants to extend its perceived "commitment to excellence" to all of its dealings in the software market, including product quality assurance, marketing operations, and third-party relation-ships.

Noncompeting for Software Business

Most of IBM's software revenue is generated by S/370 system software for which there is little or no competition. Despite the arbitrated agreement between IBM and Fujitsu, this is a situation not likely to change anytime soon.

In that agreement, Fujitsu, for an as yet undisclosed sum, was granted the right to view, under certain conditions, the source code for some of IBM's most important program products, the exact set to be determined. The settlement was reached in September of 1987, but the industry is still waiting for the particulars to be announced (i.e., how much money Fujitsu will pay IBM, whether MVS/ESA subsystems are included). A verdict on these issues is expected by the end of 1988.

The Mysterious "Repository"

None of the anticipated components of SAA are as challenging, nor perhaps as recondite, as the repository. Some have likened it to a super data dictionary where an entire enterprise's "metadata" (data about data — data definitions, physical data characteristics, security capabilities, etc.) can be stored and simply accessed by a variety of user types.

Under the repository scheme, access to an enterprise's processor resources will take place through common views, each geared towards the processing requirements and skills of a particular class of users. Application users could have a common execution view; programmers a common development view; administrators a common management view.

The common views will be maintainable separately from most efforts to manage the repository storehouse. Thus, servicing new users' requirements can be accomplished more easily. Without undertaking the often complex task of full-blown development, views on the enterprise's information system may be customizable to meet a user's need.

Turning that around, the structure of resources, too, can be significantly revised as needed with much less impact on those using them.

The repository can be looked upon as the backbone of SAA, the primary tool for systems integration. Sometime between now and next spring, IDC expects IBM to introduce an SAA interface for "repository services." One will not rush out and buy a repository, but rather build one with SQL-based tools, including many from independent software vendors, according to these SAA protocols. And like all things SAA, this will take years.

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Regardless of the ultimate findings, it is still not certain that Fujitsu, or anyone else for that matter, will be able to compete against IBM for S/370 operating system software business. Plug-compatible hardware is one thing (and not so easy a thing, as NAS has lately been discovering). Plug-compatible operating systems are another thing entirely.

Chances are, most high-end S/370 customers won't want to take the chance that they will find themselves out of step with IBM's operating system directions. Moreover, since one of the forces restraining IBM's success with midrange S/370 products is unwieldy operating systems software, it appears unlikely that a midrange S/370 operating system software market will develop.

As for the likelihood that Unix will successfully shake IBM's hold on the S/370 software revenue stream, IDC research indicates very low Unix interest among Big Blue's mainframe customers. The *Gray Sheet* believes widespread use of Unix on IBM's mainframes is still years away.

Competing for Software Business

Both of IBM's software units have more than just development responsibilities. As lines of business, they also are responsible for program management and profit/loss.

The most immediate means available to meet these goals is to control software-associated costs. In addition to the efforts to control cross-system development activities, ASD and PS will implement controls on headcount, general office budgets, and cross-lab development operations.

The SolutionPAC concept will apparently serve as the basic delivery vehicle for most program products facing competition. An IBM SolutionPAC bundles appropriate levels of support, education, installation service, and after-sale support together with the application or integrated group of applications. IBM will make great use of third-party packages in its SolutionPAC products. This usage will extend beyond SolutionPACs based on a single application, such as IBM's use of Hogan's banking package as the foundation for its Banking SolutionPAC, to products incorporating individual applications from a variety of sources, such as IBM's likely use of Lotus' 1-2-3 spreadsheet in its integrated office system.

Initial intelligence indicates that IBM will opt for a mix-and-match approach to large integrated SolutionPACs; in other words, components will be offered individually and combined to meet the customer's needs. What is not clear is how IBM will view efforts on the part of independents to attack particular segments of the whole, such as a spreadsheet in the office system. Should the competing independents dutifully write to the application's interfaces in accordance with SAA, the question reduces to: To what extent will SAA FUD be used as a competitive weapon against independents?

The answer, if all is as it appears, is: minimally. There is no doubt that IBM will copyright certain aspects of SAA and work to protect its proprietary interests, but the *Gray Sheet* believes these efforts will largely be aimed at other systems providers. IBM absolutely wants a stable SAA for its own development work, for its customers, and for its independent software market.

Still, behind the superficially apparent is a series of major assumptions that may be difficult to satisfy. Three stand out:

First, dutifully subscribing to SAA interfaces in developing applications implies major adjustments in methodologies across the industry. The tritest truism in the computer industry is that application development is an art, not a science. People do not completely uproot one way of doing things practiced for years and reinforced daily in software maintenance activities for another overnight. Change of that magnitude takes a long time to implement fully.

Second, while SAA is meant to be an evolving architecture, major portions of it, particularly in the common programming interface, are still not

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in place. Missing are many components expected to be critical to application systems in the 1990s and beyond. Among them are interfaces for security, data transformation (e.g., PC byte stream form to the 3270 data stream form common in SNA, and vice versa), expert systems language, network libraries, and a common repository for application development.

One critical component IBM has begun installing is the protocol for distributed database. Called Distributed Relational Data (DRD), the interface describes how distributed SAA-compliant database programs will communicate and work together. Support for implementing DRD is limited, but it represents a large step towards providing functions necessary for developing and executing networked applications.

Third, while the interfaces are meant to be viewed as protocol boundaries, the scope and magnitude of SAA is so grand that its behavior as a system may almost always border on the unknown. There is nothing simple about getting similar constructs to work exactly the same in completely different execution environments. A number of forces will be conspiring against IBM in this regard:

- Machine differences. The architectural distinctions between IBM's machines are enormous. Ensuring that each protocol behaves uniformly regardless of a machine's architecture is an imposing technical problem.

- Product differences. For many SAA products ultimate responsibility is held by different individuals within a variety of business groups at IBM. Product managers are evaluated on the basis of, among other things, the financial success of their products. IBM recognizes strong temptations exist to incorporate machine-specific function into programs to make them and the hardware products on which they run more competitive, without concern for SAA.
  Which is the reason for creating PS. To date, Earl Wheeler, IBM's VP of Programming Systems Division, has done a remarkable job of consensus building, influencing, cajoling, and ordering these many different people to comply to SAA specifications. Still, subtle differences in interface and protocol implementations between SAA products could lead to major inconsistencies at run-time.

- Growth in the size and complexity of networks. One of the goals driving SAA is to facilitate building large heterogeneous networks running intricate applications servicing a wide variety of user needs. As new nodes, applications, or users are introduced, the likelihood of problems and breakdowns increases geometrically. This, of course, is a dilemma facing not only IBM, but any organization wishing to construct large network systems. The behavior of massive systems of the type IBM refers to with the term "enterprisewide" is difficult to predict with any precision.

This is not to say that IBM can't do SAA, just that it is a massive challenge fraught with significant difficulties that won't be completely overcome anytime soon. IBM may well be able to deliver all the components critical to SAA within five years, but at that time the real difficulties will begin — training the market to adhere to SAA's tenets.

Still, IBM's moves to more aggressively compete for software dollars will change the way business in the software industry is conducted. SAA, if generally accepted, will greatly lessen the strategic caution that must currently be exercised by customers when purchasing software subsystems. Instead, time and energy can be spent evaluating the applications themselves.

More and more, higher-level first-time end-user buyers will be making the software purchase decisions. IBM will be positioned to take advantage of this trend with a direct sales force able to penetrate the upper reaches of customer organizations. ASD and PS will help provide the high profile necessary to support these efforts.

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PRESENTING OS/2 1.1. On Halloween, IBM and Microsoft jointly announced the availability of Presentation Manager (PM) for OS/2 Standard Edition (i.e., sans integrated database and communications software). From a technological standpoint, nothing particularly outstanding about that. The Presentation Manager of 1988 seems to offer similar capabilities as the Mac of 1984. No industrywide breakthroughs here.

But most of the market is DOS-based. From an industry standpoint, PM means plenty. Sixteen software developers (including Microsoft and IBM) participated in the announcement. The ultimate success or failure of IBM's OS/2 strategy may well be determined by the marketplace's acceptance of PM as a desktop operating environment.

As for the nitty-gritty, PM will run on all of IBM's Intel 80286/80386-based machines, including no-longer-shipping AT and XT/286 models. One time charge for OS/2 Standard Edition 1.1 is $340. Purchasers of IBM's non-PM version of OS/2 Standard Edition can receive free upgrades, and should encounter no compatibility snags (save a couple of easily trivial ones). Finally, Extended Edition of OS/2 1.1, which includes the database and communications components, is slated to begin shipping this month.

HP TAKES PRICE SWIPE AT PC LEADERS. Following its action in July 1988 to slash prices on its high-end 80386-based IBM-compatible PCs by up to $1,800, HP has cut prices on its lower-end 80286-based Vectras by as much as $400. For the HP Vectra ES Model 10, its least expensive 80286-based machine, this amounts to a reduction in price of 16.7%.

The *Gray Sheet* sees two potential reasons for HP's recent move: (1) to attack the soft underbelly of high-price first-tier PC players like IBM and Compaq (during a time when many are adding memory surcharges); and (2) create room in its product line for new introductions. But any way you look at it, HP has been most aggressive in the PC arena during 1988.

QUICKEST DRAM FROM NMB. Japanese-owned and California-based NMB Technologies has begun sampling 1MB DRAM chips with access times of 60, 70, and 80ns. To achieve what NMB claims to be the world's fastest memory speeds, the company employed 1.2micron and tungsten-silicide film deposition technologies, among others. At these speeds, computer designers can build systems with 20MHz microprocessors without resorting to expensive memory interleaving or caching schemes.

BUYOUT HOPES PEACHTREE BEARS FRUIT. For the third time in just over five years, little Peachtree Software, one of the original independent software vendors for the IBM PC, has changed hands. In 1981, the Georgia-based software house was tapped by IBM to write an accounting application for its then-unannounced microcomputer. In 1981, mainframe software giant MSA, also based in Georgia, paid $5.5 million to make Peachtree the vehicle for its forays into the PC world. But after repeated slammings at the hands of folks who knew what they were doing, four-years later MSA sold Peachtree to Intelligent Systems for $1.1 million. Peachtree fared better there, and a group of investors led by Peachtree's management just bought the company in a deal valued at $20 million. Quite a trip for a small company to get back to where it started.

A NEW DUO TAKES TO FACTORY FLOOR. Stratus and Motorola are teaming up to provide an integrated solution for the factory automation market. Motorola, behind the efforts of its Motorola Computer X arm, provides the plant, area, and cell control computers; Stratus, with its XA2000 family of products (based on Motorola 680X0 chips), the upper-level transaction-processing business systems and links to mainframe and engineering workstation resources.

CULLINET AND UNIX? Cullinet has recently been scoring impressive banking software and DBMS victories. Most recent — Enterprise:DB (formerly IDMS/SQL) on Unix, and AT&T standardization on Cullinet's "Enterprise Computing" development tools.

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A Note On Next, pg. 7.

The Mobile Computer Market Is Learning to Walk

After a couple years of being a supply in search of a demand, the mobile personal computer market appears poised for rapid growth. Aware of this, most of the industry's prominent PC vendors have spent much of 1988 elbowing each other for advantageous positions.

Driving the demand for mobile machines — expected by IDC to grow at a compound annual rate of 26% through 1992 — are vast improvements in component technology. Reduced power consumption and better batteries, enhanced screen resolutions, and greater storage capabilities — all in smaller, more lightweight casings — are primary contributors to increasing the utility of mobile computers.

PC manufacturers have been combining these components, and themselves, in novel ways to provide attractively priced packages to users looking to take it with them. Consider the following:

- In recent months, at least five different major vendors have introduced new products. Joining NEC Home Electronics, Toshiba, and GRiD most recently in this round of one-upmanship are Sharp and Compaq.

- In July of this year Tandy consummated its acquisition of GRiD systems, a technology leader in the mobile PC market. Tandy benefits from GRiD's Cadillac image and direct sales contacts, while GRiD benefits from Tandy's financial might, buying power, and manufacturing expertise. In the future, it is possible that GRiD machines could also be sold through Tandy retail outlets.

- Retail prices for low-end 8088/8086-based and midrange 80286-based mobile systems have dropped to within 20% of larger, similarly configured desktop models. Prices for 80386-based mobile systems, however, still fetch a premium of up to 50% and more.

- Notably absent from the leadership ranks in the mobile PC market are IBM and Apple. A competitive 80286-based entrant from IBM appears overdue. Apple is expected to introduce a "Pack Mac" sometime during the first quarter of 1989.

- "Docking" units (or trays), providing a continuous source of alternate current power and built with AT-style expansion slots, are turning mobiles into flexible desktop systems, further expanding the market acceptance of mobile PCs by enhancing their positions as workstation substitutes. Users looking to work with a single CPU and willing to settle for slightly cramped keyboards and small gray-scale displays are gravitating to this solution.

The market for mobile computers is further spurred by expected changes in work force demographics. U.S. Department of Labor statistics project healthy increases in the pool of mobile professionals through 1995. In particular, the insurance, finance, and real estate markets — all strong target markets for these machines — are expected to record the strongest growth in employment among the service industries.

Size Does Make a Difference

If viewed from the standpoint of industry lifecycles, the mobile computer appears to be in transition from an embryonic stage to a growth stage. Entrance barriers to the market are still low; technological features are vital to a prod-

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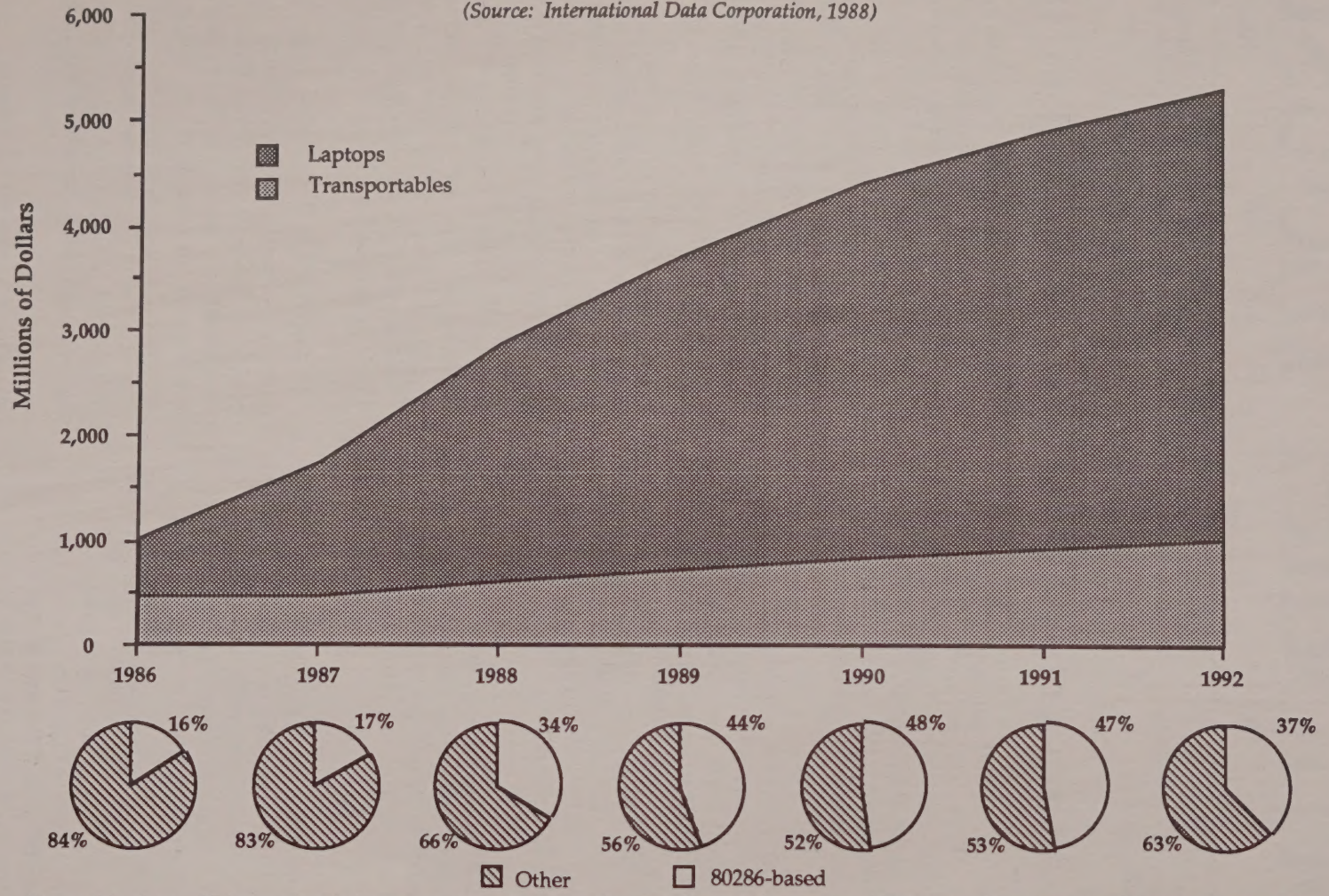
Projected Value of U.S. Mobile Computer Market for U.S.-based Vendors By System Class and, for Laptops only, Base Microprocessor, 1986-1992

(Source: International Data Corporation, 1988)



About this chart If the market behaves as expected over the next four-to-five years, 80286-based laptops should begin to dominate shipment value. However, as the market further matures — perhaps in the '90-'91 time frame — price competition among these machines will force shipment value down, although unit shipments should continue to rise. Not until around 1992 are 80386-based machines expected to dominate.

uct's success; and new entrants are being attracted by the potential of growth and high margins.

Implicit and explicit moves by entrenched and entering vendors are demarcating the market, in terms of size (the obvious differentiating factor in the mobile market) and price, into four competitive segments — three laptop, one transportable. They are:

Lightweight laptop. Less than ten pounds and small enough to fit within a briefcase, lightweight computers employ nonvolatile read-only memory (ROM) cards instead of a disk drive to load software. The limits of this approach restrict lightweights to situations where portability is the utmost concern.

Currently, only two models qualify as lightweights — NEC Home Electronics' intrepid UltraLite, and Toshiba's less-impressive T1000. However, the *Gray Sheet* anticipates much activity in this segment as Toshiba, Zenith Data Systems, and others prepare to roll out new machines in 1989. Prices of lightweights are expected to settle in the $1,000-1,500 range after these new entrants.

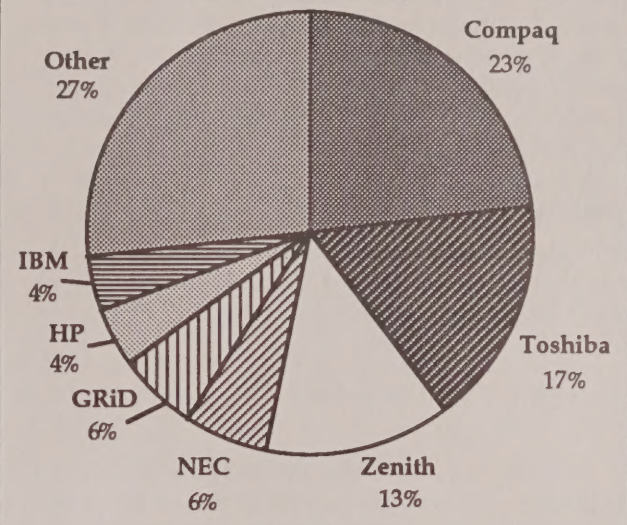
Middleweight laptop. The most popular class of mobile machines today, and the one expected to enjoy the greatest growth, middies weigh anywhere between 10 and 15 pounds and are being configured with an 80286-class microprocessor and a 3.5" hard disk.

Innovations in the middie market are expected to be introduced at a frenzied pace over the next 18 months. Increased availability of low-power CMOS 12 and 16MHz chips, faster, thinner, more efficient 3.5" hard drives, smaller, more reliable power supplies, and greater manufacturing yields of LCD displays are expected to increase the performance and lower the component costs of these machines.

Moreover, as the DRAM shortage abates and manufacturers ramp up assembly, the system costs could tumble by as much as 20% from current price points between $3,500-6,000. This will further erase the price differential between portable and desktop machines (although not entirely, for desktop prices too should drop during this time).

U.S.-based Vendor's 1987 Shares of the U.S. Mobile Computer Market

(Source: International Data Corporation, 1988)



TOTAL: $1.7B

Most all major mobile computer manufacturers participate in the middie market, but Zenith, Toshiba, and NEC have successfully distinguished themselves from the rest. Add to that list Compaq, whose recently introduced SLT/286 is expected to be very competitive.

Heavyweight laptop. Putting an 80386 MCPU into a mobile does not make it an instant success. The componentry and power supplies required to support Intel's most powerful chip makes for a system typically weighing nearly 20 pounds and costing between $7,000 and $12,000. Moreover, power consumption of these units effectively limits their battery times to about 1.5 hours.

Although a few companies (e.g., GRiD) are successfully moving heavyweights to such users as software developers, Unix and OS/2 aficionados, and engineers, the practical constraints of brief operation times and gray-scale displays will limit the demand for heavyweights until prices drop.

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Transportables. IDC means by transportable suitcase- or lunchbox-shaped machines, some sporting small CRTs and weighing more than 20 pounds. Transportables, from vendors such as Compaq, can not be run on batteries alone. However, free of any power constraint, these machines can be built with the best components available. In the case of Compaq, the Portable (sic) 386 Model 100 is based upon a 20MHz 80386 microprocessor and a high-performance 100MB drive with an average access time of 25 milliseconds. Use on an airplane tray is impossible, but they're easier to lug home from the office than desktop machines.

Compaq's Looks Good

Indeed, until recently the only mobile computers offered by Compaq have been transportables. Compaq's experience in the mobile market goes back to its origins. In 1984, partly by offering IBM-compatibility in a suitcase, Compaq was able to deftly thrust into the personal computer market and claim a leadership position in the emerging clone industry.

Compaq since has improved its transportables many times. However, the company stated it would not join the laptop fray until, to paraphrase numerous company spokespeople over the years, "laptop technology was mature enough."

Of course, Compaq had its hands full pursuing other opportunities, so one could also interpret its comments as euphemisms for "until the laptop market gets big enough."

Whether the technology is mature, or the market is big enough, or both, on October 13 Compaq introduced its first laptop machine, the SLT/286. Like previous Compaq forays into new markets, the SLT/286 boasts an impressive differentiator to serve as the basis of a well-conceived marketing strategy.

The most difficult technical stumbling block facing laptop vendors has been display technology: How to make flat-panel screens readable from a comfortable distance and keyboard position? Attempts to improve the resolution of LCD and gas plasma displays have been met with mixed reviews. Most often heard complaints are slow screen refreshes, tiny display areas, poor contrast, and difficulty seeing anything from any position other than straight on.

Compaq has separated itself from the pack by being the first laptop vendor to ship a battery-powered, liquid crystal, supertwist, VGA display. The screen, which measures 10 inches diagonally and sports 640 x 480 resolution, can deliver eight shades of gray with impressive clarity.

Other than the display, nothing about the SLT/286 is overly aggressive, but is instead competitive with other middleweight laptops. For instance:

- The unit weighs 14 pounds.
- The CPU is a 12MHz, CMOS 80C286 chip.
- The floppy is a 3.5" 1.44MB drive. (A 5.25" extension drive is optional.)
- Two different hard drives are offered, a 20MB (3:1 interleave) and a 40MB (1:1 interleave). Both are shock mounted and have an average access time of 29ms.
- A nickle-cadmium battery pack can generate up to three hours of continuous battery-powered operation without recharging. Recharges take about 1.5 hours. Additional battery packs are small enough to be carried in a briefcase.

Other options include a 101-key enhanced keyboard, a docking unit for desktop use, and an internally installed 2,400-baud modem.

In keeping with Compaq's historical positioning, price is not one of the SLT/286's drawing cards. For the innovative display (and the Compaq name), customers will have to pay between $5,400 and $6,000, about $500 more than competing laptops from other vendors.

(continued on page 6)

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Getting from Here to There in the Mobile PC Market

The transition from the embryonic to growth stage in the mobile computer market has at least eight practical implications:

Sustained growth on expanding sales base. New customers are being identified by vendors, or are seeking out mobile solutions. Using the U.S. Department of Labor's Employment Projections for 1995, the *Gray Sheet* estimates there are roughly 7.5 million potential customers for mobile computers today (field technicians, reporters, sales reps, auditors, etc.). By the end of 1988, about 2.5 million mobile units will have been installed since 1985. However, perhaps as many as half of these are candidates for replacement.

Demand can be more reliably forecasted. Compaq has intimated that through the remainder of 1988 demand for its SLT/286 will exceed supply. But, it expects that during 1989 a proper balance will be struck. This appears to hold true for other vendors as well. Contingent upon the availability of DRAM chips, the *Gray Sheet* anticipates the market should operate near equilibrium. Of course, discontinuities could result from extreme price reductions based on achieved economies of scale or a new entrant attempting to buy share, but neither of these situations appears to be on the horizon.

Rapid expansion in the breadth and scope of product lines. As prices of components fall and manufacturing learning curves are scaled, vendors will be in position to flexibly package and price different combinations of mobile computer features. However, the *Gray Sheet* believes that the four classes of mobile computers discussed in the text will remain relevant for comparison purposes: lightweight, middleweight, and heavyweight laptops, and heavier transportables.

An increase in the number of players. There is no reason to believe all interested parties have entered the market. Growth and margins appear to be fat enough to attract a variety of new competitors, and keep most of those already in the market happy for some time. No structural consolidation appears at all imminent, but should it eventually occur it may well happen along distribution lines.

Market shares begin to stabilize. Within 18 months, the longterm leadership positions in the mobile computer market could well be decided. Expect frenzied activity between now and then.

Switching costs begin to escalate. Rapid advancements in technology quickly obsolete older machines. But, as the market begins to settle into classes of buyers, haphazard innovation will give way to rational product strategies. Acquired skills, peripherals, and the bonds characteristic of a sound supplier/buyer relationship will increase customer loyalty, and begin to make it difficult to attack a competitor's installed base. On the other hand, some vendors, because of lapses in quality, sloth in introducing new technology, channel contentions, or some other source, will be very vulnerable indeed.

Entrance barriers remain low, but show first signs of rising. Devoid of crippling technical or capital impediments, competitive initiatives in the mobile computer industry can be undertaken with little fear of reprisal from competitors. The market is still a plus-sum game (i.e., volume gained by one player does not necessarily come at the expense of another) and no clear leader exists to discipline upstarts. However, as customer loyalties develop and leaders emerge, price and distribution could become deadly weapons against encroachers.

Technology remains focal point. During this phase of the industry, competition will continue to revolve around display, hard disk, microprocessor, add-on, and battery technology. Vendors able to make mobiles easier to see, smaller, faster, more extensible, and more efficient will capture a decided advantage. There appears to be a great deal of technology headroom in each prime domain.

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Some have expressed concern that Compaq is too late, that customer buying patterns are already set. The *Gray Sheet* does not believe this is the case. Compaq's display technology, distribution, and reputation will help attract new customers to the laptop market, and sway many already owning but looking to upgrade. Furthermore, Compaq's manufacturing scale and expertise will guarantee it a very healthy return as process economies and technologies become more critical. In short, the Compaq's SLT/286 looks like a winner.

Turn the Channels

Other winners, however, are less certain.

As befits an embryonic market, the competitive tendencies and resultant distribution of wealth have been unstable, swinging widely in response to large contract wins and rapid advancements in technology. However, as the size of the pie increases, supply-side behavior and market shares will begin to settle into more predictable patterns.

Expect distribution to play an increasingly important role as the market expands. In 1987, nearly one-third of mobile computers sold in the U.S. were moved through a direct sales channel. During the early life of the market, when missionary selling to large purchasing agents was critical, a first-rate direct sales force proved to be a significant advantage. For instance, GRiD and Zenith have each scored tremendous market share points as a result of winning major federal contracts.

However, as large, single-contract purchases account for a smaller portion of the total mobile computer market, this advantage will be nearly obviated. Indeed, one of the chief reasons for GRiD to combine with Tandy appears to have been the costs of supporting GRiD's expensive direct sales force as it attempts to penetrate the business market.

As the prices of these machines drop, only full-line vendors such as IBM or HP will be able to support the overhead of a direct sales force. Primarily PC vendors like Tandy/GRiD and Zenith Data Systems, on the other hand, will face some difficult choices.

Another channel sure to come under pressure is the distributor channel. Because it offers the easiest path to market entrance, nearly a quarter of all U.S. shipments were funneled through distributors.

However, as the market matures, entrance barriers are sure to increase. Vendors selling mainly through distributors face the double whammy of being separated from end-users and dealers. For a time, the distributor channel will still prove popular and effective. But shortly, the *Gray Sheet* believes firms relying on the distributor channel for a majority of sales, such as Toshiba, will have to experiment with other channels — such as VAD, mail-order, and dealer — to grow with the market.

The other vital determinant of success will be technology. Screen resolution, power consumption, weight, and quality issues will continue to provide fertile competitive ground for innovative vendors looking to harvest growth in the mobile computer industry.

The ultimate consequence of tension between vendor's channel positioning and technology offerings will be lower price. An increased emphasis on high-profile avenues of distribution, such as the dealer channel, will generate greater interest in mobile computers. Yet, as always, buyers will feel free to shop around, playing a dealer's price off against one available from a mail-order house or a distributor.

Moreover, as component standards for comparison arise, vendors will be forced to compete more on the basis of price. This will, predictably, lead to even greater buyer interest and generate greater unit shipments — but also exert greater competitive pressures on marginal vendors.

The practical limitations to the capabilities of mobile computers will remain, but there appears ample evidence to justify the market's bullishness about computing on the go.

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A Note on NeXT

What else can be said about NeXT? On Newsweek's cover, founder Steve Jobs was pictured as a take-charge guy, shirtsleaves rolled up as he prepares to "put the 'wow' back in computers."

What else can be said? Hmmm. How about, "It's only a machine."

It's a glitzy machine — one developed by the charismatic Jobs, financially backed by billionaire H. Ross Perot, and full of "ah neat" technology — but a machine none-the-less.

It won't be able to scale entrance barriers or leapfrog the competition of its own accord. To make NeXT one of the IT industry's big winners in the 1990s, Jobs and his league must hit every strategic mark with remarkable precision. Tremendous cooperation among suppliers, the company, and buyers will be required.

Their main advantage is simple: NeXT is the first to integrate a number of emerging technologies into an affordable workstation package. They also sport a great deal of knowledge about selling to the higher education market, NeXT's initial niche, thanks to expertise Jobs wooed from Apple.

But in today's world of faster rates of technology transfer and shortened product cycles, NeXT's window of opportunity may already have begun closing as other, more established vendors, prepare to introduce products using similar technologies.

At bottom, NeXT's success may boil down to this: can Jobs build a cost-effective and reliable distribution system before the Apples and Suns of the world can cost-effectively and reliably integrate new technologies into their systems? Consider the following:

- The machine will not be available until late 2Q89 (and only to the education market). By then, Jobs time-to-market advantage could well be razor thin.

- A major component of the NeXT machine, the removable erasable optical disk-drive, is, from both a technical and marketing standpoint, unproven.

- Software developers love the machine's technical vision, but, anticipating a slow sales ramp, citing software distribution questions raised by the optical media, and generally uncertain about their prospects for making money in the higher-ed market, are not completely comfortable with NeXT's strategic vision.

- Perhaps to assuage developer's concerns, Jobs has licensed NextStep, NeXT's facile object-oriented development environment, to IBM. Despite fundemental architectural differences between IBM's and NeXT's machines, the perception is that the deal improves the business prospects of writing software for the NeXT environment. But perceptions change.

- Little about the NeXT architecture is standard. Like Sun four years ago, Jobs may be seizing the initiative in hopes of building market power enough to turn any uncertainties into opportunities to influence, or even set, standards. He may, however, be overestimating his industry pull.

Then again, he may not be. Jobs is the Han Solo of the computer industry: brash, arrogant, unorthodox, yet able to make amazing things happen. Putting words in his mouth, he, like the "Star Wars" character, might respond to improbabilities he faces by declaring, "Never tell me the odds."

NeXT is innovative. NeXT is neat. And NeXT could be a big winner.

But NeXT is no sure thing. Odds are important when launching new products. Assumptions can be wrong. Contingencies must be developed. For NeXT computer, the work has only begun.

NeXT and the concept it embodies — a new form of computing — are not synonymous. The danger Jobs and his young company face is that the market may view NeXT as the platform to play on until Apple, Sun — and IBM — catch up.

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ANOTHER CAD/CAM MORSEL FOR PRIME. For the third time in thirteen months, Prime has used the acquisition route to expand its CAD/CAM business. Most recently, Prime signed a definitive agreement with General Electric to acquire GE's Calma business. With this agreement, Prime not only gets Calma's ongoing business, but special access to the fruits of GE's ongoing CAD/CAM/CAE R&D work. Calma will be run as an independent business within Prime's Computervision division. No financial details of the transaction were made available.

Using IDC CAD/CAM market statistics, the combination of Prime/Computervision/Calma would have garnered 13% of the U.S.-based CAD/CAM market in 1987. On the basis of that derived figure, Prime could now be the third largest provider of CAD/CAM services, behind IBM and DEC. It's interesting to note that earlier in this decade, Ken Fisher, now at Encore, was forced from the President slot at Prime largely for suggesting that the company should focus on its CAD/CAM business.

NOW IT'S OSF VS. "ARCHER GROUP." Somewhere in New Jersey there is a hotel suite rented to the Archer Group. There, AT&T's Unix System V allies are collectively plotting responses to OSF's activities. At this time, the Archer Group numbers 18 (sans AT&T) and includes among its membership Amdahl, Sun, Fujitsu, ICL, NCR, Olivetti, Prime, Unisys, and two chip manufacturers, Intel and Motorola.

The group announced its support of AT&T's Unix System V, release 4.0 as the basis for a consolidated Unix standard, and an intention to establish an industry association to ensure the "continued compatibility of Unix systems." AT&T is attempting to remain detached from the group's efforts, perhaps to avoid any conflict of interest questions. Despite the announcement, both sides continue with their discussions.

AT&T/IBM BATTLE OVER ... PERSONNEL ? One day AT&T announced it had scored a coup by luring Ralph Martino from IBM to be Data Systems Group's new national sales vice president. The next day AT&T announced Mr. Martino has resigned for personal reasons, and that he is on "special assignment" with IBM. The *Gray Sheet* wonders if part of his special assignment includes studying AT&T's hiring practices. Anyway, if you're interested, AT&T is in the market for a national sales vice president.

dBASE IV OUT THE DOOR... After two very public false starts Ashton-Tate has finally released its long-awaited dBASE upgrade. dBASE IV includes new features for both the end-user and developer communities. For end-users a revamped user interface, called the "Control Center," for coordinating work among individual databases, an onboard electronic tutorial, and a set of DOS utilities access through pull-down menus, are included. For developers, dBASE IV incorporates SQL, a revamped applications generator, and a built-in compiler.

According to IDC PC analyst Mary Conti Loffredo, the upgrade from dBASE III+ to dBASE IV will not be as automatic as had been the move from dBASE II to dBASE III. Moreover, dBASE IV may have a tough time winning new business. Overall assessment: good product, but Ashton-Tate is lucky it owns the channel.

... AND ONTO THE VAX. In addition to announcing the general availability of dBASE IV on IBM-compatible PCs, Ashton-Tate jointly announced with Digital its intention to port dBASE to Digital's VAX/VMS and Ultrix environments. One version of the product will be character-based for use with VT100-type terminals. Another will run under DECwindows/XUI for Digital workstations. Ashton-Tate claims the VAX implementation will be source-code compatible with existing dBASE II+ and dBASE IV applications. No delivery timetable was announced, but the *Gray Sheet* believes that by this time next year Digital will be marketing, selling, and supporting dBASE VAX.

What that means is that Digital, for agreeing to help financially underwrite the port, is opening up a whole community of applications (40,000), developers (100,000+), and users (a zillion) to VAX computing solutions. This will be especially important once Digital rolls out expected desktop VAX products.

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Big Blue's latest networking announcements, p. 6

IBM's Search Leads It to Wide Open Spaces

IBM's strategy can't be understood simply as plans to do this or that. Strategic intentions are certainly formulated in the inner sanctum of Armonk's Corporate Management Board, but no longer is the company's leadership able to flawlessly transform these decisions into action.

The will of Armonk encounters two large, and today often uncooperative, objects when it tries to move and shake the industry. First is the weight of IBM's past experience, manifested in an aging installed base and expansive corporate bureaucracy.

The old systems just won't go away. For example, in the U.S. 41% of all S/370 machines (including 43XXs) are still running either native DOS/VSE or DOS as a guest to VM. So long as these users are unwilling to migrate to newer technologies, IBM must perpetuate products better suited for competing in 1978 than 1988.

Second, and more important, is the rest of the market, which today chafes at almost all efforts to steer it one way or another, especially those of IBM.

It hasn't always been so difficult for Big Blue. For years technological and competitive standards were established oligopolistically by IBM with only occasional, often token, reference to others.

In the past year, however, it has become clear that downsizing is not a transient phenomenon, but is instead the first wave of a new competitive environment in the information technology (IT) industry. Faced with contracting growth in IT expenditures and more demanding buyers worldwide, IBM is being forced to radically adjust its competitive posture.

A nearly-completed study compiled by the editorial staff of the *Gray Sheet* examines IBM's strategy for meeting the challenges inherent in these times of change. It makes note of the following:

- IBM's market position, from the standpoint of share of shipment value, continues to erode, especially in the U.S. For instance, between 1984 and 1987 IBM's share of the total U.S. systems shipment value slipped 10 percentage points, from 41% to 31%.

- Increasingly IBM is finding itself out of sync with the industry's growth markets. Better than half of the company's revenue in 1987 was generated by the slow-growth mainframe arena. In fast-growth areas, such as the workstation or PC markets, IBM's product offerings have been struggling.

- One reason IBM is out of balance with the industry is that it is used to competing in markets where product lifecycles are measured in years, such as the mainframe space. In the newer, fast-growth markets, product lifecycles are being measured in months. IBM has apparently not yet learned to effectively manage these shorter lifecycles.

- IBM's adjustments have taken a number of perceptual, organizational, technological, and marketing forms. Yet it remains unclear what effect these moves will have: altering IBM's behavior, altering the computer industry, some combination of the two, or none at all.

For years IBM operated in a comfortable box of its own making. But the advent of standard microprocessors and systems software has blown the lid off IBM's world. Today, it finds itself in wide open competition.

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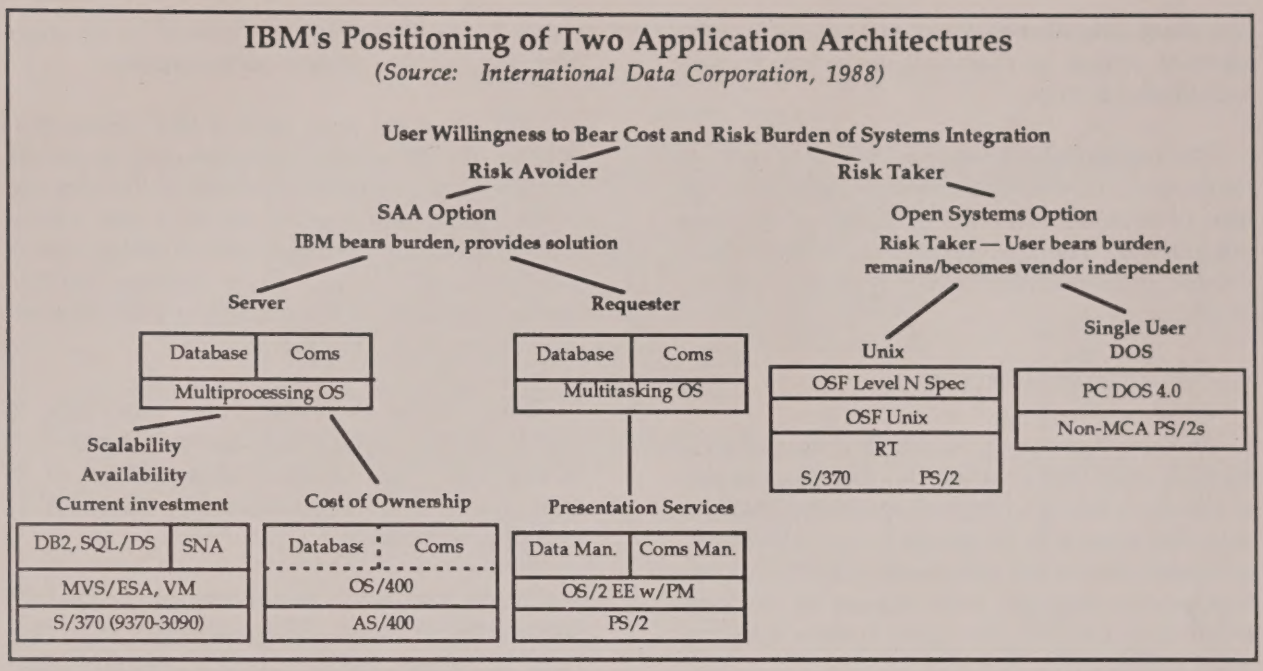

Two Application Architectures

Open competition connotes many things. One of the most important (and obvious) is the notion of competing with products consistent with industry standards.

Standards to IBM and standards to the rest of the industry are not necessarily one and the same thing. To most in the computer industry, be they vendors or users, standards are a means of lowering the costs and risks of systems development, implementation, and maintenance. A standard is primarily characterized by usefulness, stability — and a degree of openness.

To IBM, these issues are important. But not as important as three other characteristics:

- If IBM is unable to exert some measure of control over the standard-setting process, it isn't an IBM standard. Open standards, then, are those open to IBM persuasion. (This isn't unique to IBM; most any industry giant views things this way).

- IBM's standards generally allow IBM to lower its risks and costs, sometimes at the expense of the competition.

- De jure standards arbitrated by quasi-legislative bodies like ANSI gain credibility to the extent that a convergence with IBM's proprietary standards makes good business sense.

Contrary to popular opinion, IBM's motives for throwing its weight around standards bodies are not entirely sinister. A large number of users have historically placed their IT needs in IBM's care, in effect signing a proxy for IBM to represent them on such issues. But it appears certain that their numbers are shrinking.

Which is, of course, one of the primary reasons behind IBM's sharp loss of market power and subsequent decision to actively pursue two standard application architectures: one for multivendor processing environments, and one for IBM-predominate processing environments.

IBM's open architecture will be based on the amalgam of Unix-based interfaces, protocols, and conventions someday to be delivered by the Open Software Foundation (OSF). Where customers are dedicated to (or trapped by) IBM, the company will provide Systems Application Architecture (SAA), Big Blue's proprietary collection of software technologies.

IBM's intention is to undertake independent development efforts for each. However, the

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two share a number of common features, not the least of which is that neither exists to any meaningful degree.

The meaningful separation of the two, from IBM's point of view, is the customer's willingness to shoulder the costs and risks of systems integration. The tradeoff presented by IBM is vendor independence (open) versus solutions (SAA).

An Open Architecture

As things currently stand, IBM should find no fault with OSF's standards. Big Blue, as one of the foundation's original sponsors, enjoys a significant voice in its proceedings. Moreover, an as yet unreleased version of AIX, IBM's Unix implementation, has been chosen as the base technology for OSF operating system development efforts.

For those users demanding open systems, like the federal government, IBM intends to supply the most efficient, feature-rich derivative of OSF product by adding significant IBM-specific value.

A Controlled Architecture

To users less concerned with openness per se, IBM will offer SAA. IBM, unlike others, makes no apology when it trumpets proprietariness. DEC, for instance, constantly reminds people that Ultrix and VMS receive equal treatment, at least from the standpoint of development resources. IBM is unabashed in its praise of SAA.

And in some respects it needs to be. The SAA development effort is massive, employing thousands of software engineers and touching every corner of the IBM company. If IBM is successful in delivering SAA, more than just its vastly different hardware product lines will be joined. The company itself will enjoy a singularity of purpose and direction not experienced since the early 1970s.

The evolving SAA model breaks with past IBM tradition in a number of interesting ways. Most important, the concept of the three-tiered architecture of mainframe, departmental, and micro computers is being replaced by the simpler two-tiered requester-server model.

IBM is not the force behind this change, but is subtly encouraging it and preparing to exploit it. Placement of application logic, IBMers are coming to recognize, is, for the most part, a foregone conclusion. The trend will be to run shrink-wrapped code using cheap desktop MIPS. Desktops will then make request calls to servers housing volumes of data.

Data, unlike most computer processes, is highly specific to an organization. Therefore it is associated with a whole different set of issues, like availability, integrity, shareability — and performance.

Sound familiar? It's a return to the old mainframe message. IBM's objective is to capture an organization's most important data with Big Blue's most expensive machines.

It's interesting to note that as IBM's perception has swung from three to two tiers, MVS has ascended once again to wear the S/370 crown, while VM has once again been asked to play a supporting role. Eighteen months ago, the message from Armonk was decidedly different. S/370/VM, it was said, would become to IBM as VAX/VMS is to Digital: a common operating environment stretching from 9370s to the largest 3090s.

The new monarch among operating systems is MVS/ESA (see the ***Gray Sheet***, 23:21, March 4, 1988). ESA is specifically designed to provide efficient access to tremendous volumes of data (up to 16 terabytes) with a high degree of availability and integrity.

But, as befits a king, ESA requires a large retinue of supporting programs and skilled personnel to operate, which costs a fortune. To organizations more concerned about the cost of ownership, such as small-to-medium-sized businesses and nonprofits, IBM will push the AS/400.

The AS/400's object-oriented architecture limits the number of bells, whistles, and nobles needed to run the system. Moreover, IBM is of-

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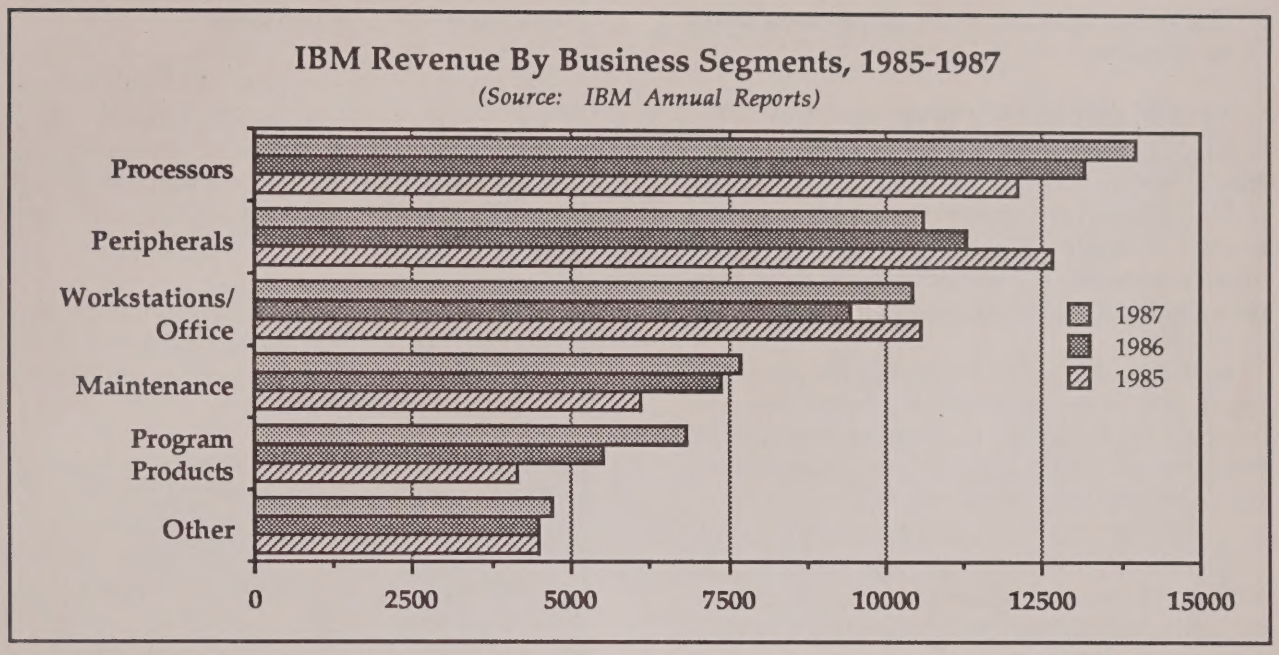

fering a very competitive level of service and support to AS/400 customers.

For Now It's Controlled vs. Open

Among the very important software subsystems (the bells and whistles) incorporated directly into the AS/400's object-oriented architecture are powerful database management facilities and communications functions. Taken together, these subsystems provide a very robust operating environment that remains among the easiest to use in the industry.

The conceptual organization of the AS/400's environment, a derivative of the popular S/38, appears to have been borrowed and transferred to all of IBM's strategic product platforms. As SAA evolves, it could be that database and networking subsystems will become standard, almost required (bundled?), environmental components on PS/2s and S/370s.

Certainly IBM hopes so. Its sales and marketing goals are four:

1. Make money from system software sales (or rentals, as the case may be).

2. Facilitate the introduction of new hardware and application technologies to the installed base.

3. Improve application portability across processor families.

4. Eventually allow for cooperative processing between server and requester systems.

Each of these goals is strategic for IBM, but of them perhaps the second and last are the most important.

First, the second: SAA may be proprietary, but it stands in opposition to very attractive open substitutes. Further barriers to commercial Unix will be cleared not incrementally, as IBM has always done, but by leaps and bounds. If IBM is to become nimble enough to respond to these discontinuities, it must normalize the incongruities that have come to dominate its installed base and product lines.

SAA, then, can be viewed as IBM's regimen for getting back into competitive shape. But like all diets or workout programs, it must be adhered to. IBM's installed base will never embrace SAA if it regularly witnesses IBM violating its own strategic dicta.

As for the cooperative processing goal, IBM has awakened from its dream of unilaterally growing at double-digit rates regardless of what the rest of the computer industry is doing. For IBM to realize any significant change in its

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size (other than negative), its products must be symbiotic.

In 1984, IBM told the *Gray Sheet* that in the future, for every PC MIPS linked to a mainframe, the host would have to deliver 1.5-3.5 MIPS. The server/requester model lowers that number considerably, but the essence of the thought remains: big systems are not about to be obviated by desktop computing.

IBM's challenge, as it unfolds the SAA umbrella, is to make its S/370 or AS/400 (and, depending on situation, perhaps even powerful PS/2) server MIPS and PS/2 requester MIPS, the most attractive on the market.

Over time, if SAA is a success, desktop sales will feed host sales, and vice versa. Moreover, not only will system sales increase, but peripherals revenue will also grow.

To expand SAA's appeal, IBM will borrow or buy technologies from the industry. That may, to some degree, include opening up SAA beyond just publishing specifications, although it is unlikely IBM will ever convene an "open SAA Foundation."

Adjustments are a certainty, but the way IBM currently has its mainline SAA strategy for the next decade set up, either everything will grow, or nothing will grow.

The Computer Industry Report's 1988 IBM Strategy Report can be ordered by calling Peter Mirsky, Manager of IDC Report Sales, at 508/872-8200 x.368. Cost is $750. Availability is November, 1988.

IBM OSI — OK

Historically, to IBM multivendor connectivity has meant other vendors scrambling to build SNA gateways to their products. Rarely, if ever, has IBM reached out to access others.

In one sense, nothing changed with its networking announcement on September 20. IBM still views its environment as the one for every vendor to serve and care for.

But in another sense, a tremendous change has taken place. IBM has acknowledged the emergence of ISO's Open Standards Interconnect as just that, and will over the next two years roll out products to integrate it with SNA on type 5 physical units.

The extent of the announcement comes as something of a surprise. A few details:

- Not only has IBM scheduled delivery of a robust subset of OSI products, but it has directly included OSI interfaces and protocols into SAA's Common Communications Support specifications. Thus, although initial implementation will be for the VM, MVS/XA, and MVS/ESA environments, the *Gray Sheet* believes OSI support for the AS/400 and PS/2 is an eventuality.

- TCP/IP protocols, the foundation for many technical, educational, and governmental networks, are now supported in MVS environments. Previously, TCP/IP support was available on S/370s only under VM and AIX/370.

- Netview, IBM's much maligned network management program, has been updated. Release 3 includes a number of important new simplifying features that will quell some of the hissing.

- For the first time, two non-IBM product lines will be supported by Netview at the host level. C-lists for controlling Bytex's matrix switches and NET's IDNX T-1 muxes can be executed by an operator at a Netview console.

- A new channel attach LAN controller, the 8232, for connecting token-ring and Ethernet networks directly to an S/370 under VM was announced. MVS support could occur next year.

- Also announced were a number of new or en-

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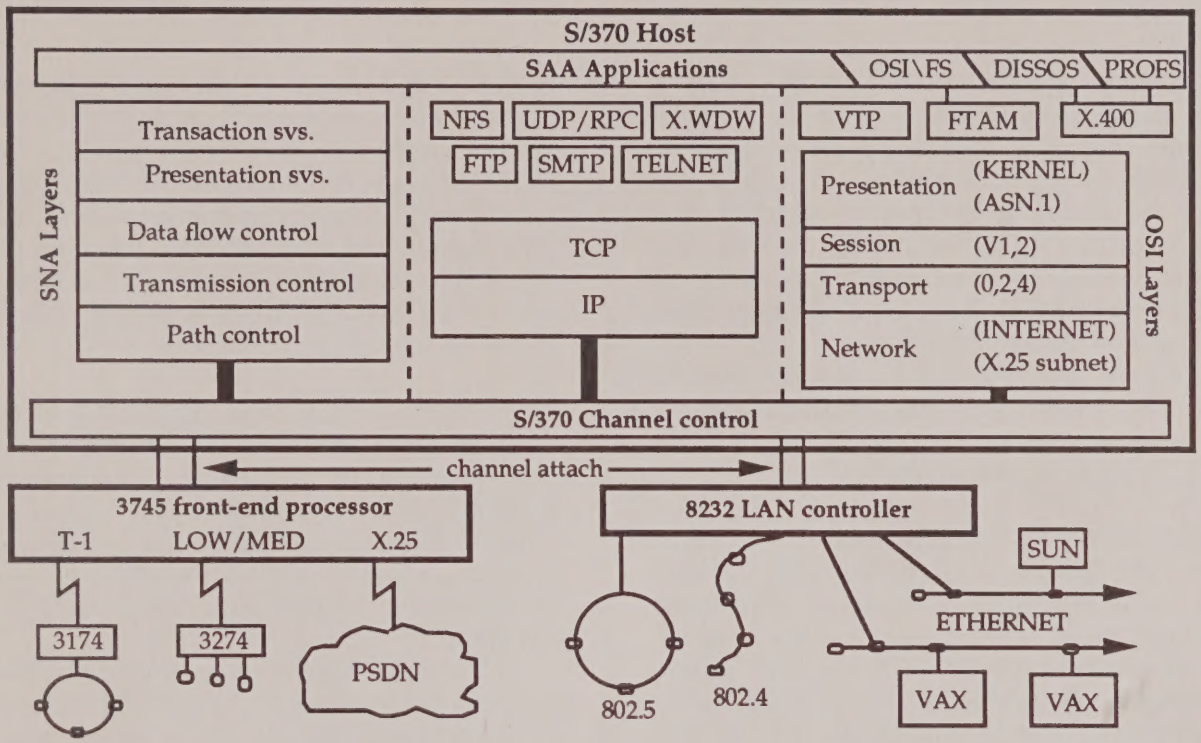
IBM's S/370 SNA/OSI Implementation

(Source: International Data Corporation, 1988)



The arrival of OSI on S/370 machines does not in any way herald the departure of SNA. Each will be concurrently supported. The technical effort (i.e., business and marketing issues aside) to bring OSI to the S/370 family was made easier by the architectural similarities between SNA and OSI. In particular, the two lowest logical layers of each, physical and data link (IBM appends "control" to both in SNA lingo), prescribe almost identical functions and services. Subtle but imporant differences exist as one conceptually ascends the two stacks, but making the effort most difficult is the way IBM has implemented SNA function over the years: in hardware. OSI, on the other hand, is mostly defined in terms of software interfaces. As a result, providing what appears to be a relatively clean mapping between SNA and OSI is a technical triumph for Big Blue.

hanced communications processors and modems. Of these, perhaps IBM's new high-end modem products, the 7850s, merit the most attention, because they threaten the very existence of some of IBM's struggling modem competitors.

OSI Moves: Surprisingly Aggressive

The full suite of OSI protocols will be made available in the mid-1990 time frame, plenty of time for customers to plan for incorporating OSI support on their SNA networks.

IBM's OSI program set is called OSI Communications Subsystem, or OSI/CS. It incorporates support for, among other things, FTAM, X.400 messaging services, and many alternative protocols within each of OSI's lower layers.

For the foreseeable future, OSI support will be constrained by what can be mapped with SNA devices. Relative to other implementations of OSI (many of which are not as rich), this could somewhat raise the costs of developing and supporting IBM OSI networks, reduce performance, and make enhancing individual layers more difficult.

The massive installed base of SNA devices restricts IBM's chance to become a major contender for the OSI heavyweight crown, but at least it has finally climbed into the ring with more than a token entry.

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DEC GRABS A NON-MCA TANDY. . . IBM's chief nemesis has inked an OEM agreement whereby Tandy will build PC AT-compatible machines to Digital specifications. Detailed specs are not available (because Digital isn't sure what they'll be), but expect the first version of the machine to be a DOS X/Server (i.e., DOS with a DECwindows shell, perhaps standard with an Ethernet card).

Digital also announced inclusion of support for IBM's PS/2 models 50, 60, and 80 Micro Channel machines within its VAX/VMS Services for MS-DOS personal computers.

WHILE TANDEM PICKS A MAC. Beginning in early 1989, Tandem will sell, support, and service Apple Macintosh computers. The four-year deal could help increase Apple's penetration in financial services, telecom, and manufacturing environments by leveraging Tandem's direct sales presence in those areas. Reaping one of the fruits of its purchase of Ungermann-Bass last February, Tandem intends to develop Mac connectivity products, paying particular attention to supporting Mac-to-NonStop systems communications.

DG SUPERMINI POWER LEAPS TOP VAX. Data General's five new high-end MV/40000s offer loyal DG customers up to 50MIPS in a quadratic configuration. Listing at about $3.5 million, the top-of-the-line quadratic MV/40000 HA (for high availability) Model 4 approximately doubles the performance of DEC's 8840, another quadratic symetric multiprocessor. The price/performance of the two machines is almost identical.

UNISYS DEFENDS SPERRY ACCOUNTS. In the latest move to stem the flow of Sperry's 1100/2200 mainframe customers to other vendors, Unisys has aggressively enhanced the line's high end. The 2200/600s use proven VLSI/ECL and 1MB DRAM technology, retain the family's air-cooled heritage, and improve the machine's space and power consumptions as was expected. Indeed, the only hardware surprise is that Unisys had to go to the Japanese for the chips, which were supplied by Hitachi. System software improvements, however, have increased the machine's transaction throughput considerably. Unisys claims its quadratic 2200/600s, running the Extended Transaction Processing Architecture (XTPA), can achieve rates of up to 6,500 transactions per second (tps) for certain simple types of transactions.

IBM's DBMS TOE IN DISTRIBUTED WATERS. IBM has announced a new interface for its Systems Application Architecture Common Programming Interface specification. Called Distributed Data, as defined it allows any SQL application in any SAA environment to access relational data in the same or any other SAA environment.

The promise holds that any user (here "user" can be either a person or a process) will be able to send requests for database work (so long as the request is written in SQL to SAA specifications) to a network of SAA relational database management systems (DBMSs) and have that work performed — without knowing where on the network the data is located. IBM also announced a new release of DB2 incorporating Distributed Data support.

CHANGE IN THE EXECUTIVE WASHROOM. Citing a desire to improve his long-iron play, Joe Henson, Prime's CEO for most of this decade, announced his intention to step down within the next few months. Replacing him will be Anthony Craig, ex of GE's GEISCO division.

In another management reshuffle, James F. McDonald, Gould's chairman and CEO, has resigned to become president and CEO of Gould NavCom Systems, Inc., a subsidiary handling all the company's defense contract work. It was expected that McDonald would be named president and CEO of Gould after its absorption by Nippon Mining, but apparently he desired a position a bit more removed. NavCom's day-to-day operations are beyond the purview of Nippon as a result of an agreement to deflect any U.S. Government objections to the merger.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR SEPTEMBER 29, 1988 • VOL. 24, NO. 7 PATRICK J. MCGOVERN, PUBLISHER

"BRAT Pack" Attacks IBM's Micro Channel

In the IBM PC-compatible realm, when the battle is done, there may only be one. And it may not be IBM's.

Standard that is, in this case the standard for the input/output (I/O) bus specification.

Whereas the OSF/AT&T and other industry confrontations are characterized by myriad issues, players, alternatives, and agendas — in other words, tremendous complexity — the evolving fight pitting nine of the world's largest PC clone manufacturers against IBM is relatively straightforward and simple.

By basing the upper reaches of its new generation of personal computers, the PS/2, on a proprietary "Micro Channel Architecture" (MCA) and foregoing the far more open AT bus, IBM is endeavoring to, among other things, more closely monitor and influence the pace of innovation in the computer industry.

And clone companies that have been successfully outmaneuvering the big blue hulk precisely by being more innovative are not pleased. Their innovations have taken technological, manufacturing, marketing, and distribution forms and have led to massive growth rates until, today, they are in a position to challenge Armonk for leadership.

Enter "Extended Industry Standard Architecture," or EISA, a 32-bit enhancement to the industry standard 16-bit AT bus. Sponsors AST, Compaq, Epson America, HP, NEC, Olivetti, Tandy, Wyse, and Zenith — the "BRAT" Pack (for Basically Revised AT) — intend to establish EISA as the open standard I/O bus for computers built with Intel's powerful 32-bit 80386 microprocessor.

Unwittingly, IBM appears to have fired the battle's first shot, before seeing the whites of anybody's eyeballs, into its own big blue foot. On the same day that EISA was announced, IBM was debuting what amounts to a PC AT kicker machine: the PS/2 Model 30 286, built not with the MCA, but a variant of the AT bus.

If it looks like a retrenchment of IBM's MCA strategy, that's because it is. IBM has been losing huge volumes of PC-compatible upgrade business in part because installed XT and AT extension cards could not be migrated to the MCA PS/2s.

Just how huge? IBM's market share of U.S.-based manufacturers worldwide personal computer unit shipments plunged 7 percentage points in 1987, to 17%.

IBM's foot will heal in plenty of time to engage the revolt. EISA product is not expected to be delivered until late 1989, perhaps to give each of its sponsors time to ready deliverable systems.

However, henceforth battle lines will be drawn on a number of fronts. Prominent among them will be:

- Expansion board manufacturers. EISA, unlike MCA, will allow them to continue to milk existing cash cow peripheral add-in cards.
- Desktop business. EISA makes the world safe for open AT-compatible systems. It assuages fears of being locked into a single vendor.
- Server system business. Systems built with 80386 chips to the 32-bit EISA spec will be positioned primarily against minicomputers in commercial workgroup environments.
- Unix. EISA systems should be better Unix platforms than existing PC compatibles, further fueling the Unix conflagration sweeping the proprietary world.

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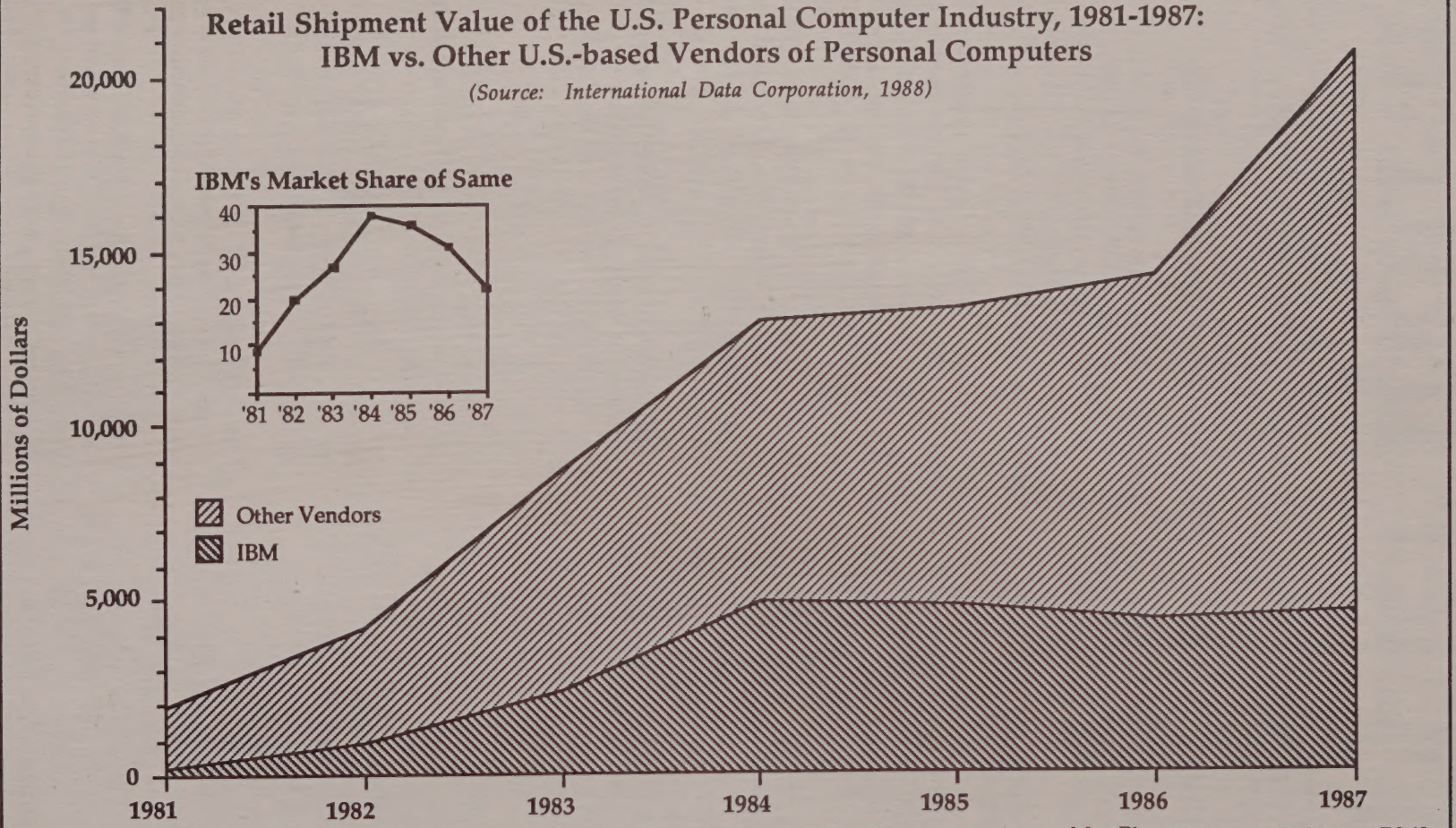
Retail Shipment Value of the U.S. Personal Computer Industry, 1981-1987: IBM vs. Other U.S.-based Vendors of Personal Computers

(Source: International Data Corporation, 1988)



1981 — Apple is leader on desktop. IBM intros IBM PC, sets new standard. More than 2.5 million IBM PCs installed today.

1982 — IBM PC business grows nearly 400%. Especially strong in business market. Then-CEO Opel directs ESD to deliver a home computer.

1983 — Apple intros Lisa, the Tucker of the PC industry. Compaq begins shipping clones. IBM ships Intel 8086-based PC XT, over 1.7 million installed in U.S. today.

1984 — Apple rolls out MAC. IBM intros PCjr for home and 80286-based PC AT. jr flops — first PC failure. IBM U.S. mkt. share at peak: 38%.

1985 — Clones enter in droves, opening up new channels in process. Compaq debuts Deskpro. A hit thanks (in part) to IBM decision to constrain AT price/perf.

1986 — Mac Plus starts Apple climb. Compaq first to market with 386 machine. Price competition slows industry growth to about 5%. IBM ship value in '86 less than in '84.

1987 — IBM intros PS/2 line and new system bus, the Micro Channel. Market ho-hums. IBM U.S. PC revs up 6%, while rest of industry jumps 62%. IBM market share at 22%.

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BRATs Pounce on MCA Doubts

Eventually, went the plan, the clones would, after much bemoaning their situation, accept their plight, pay IBM for the use of its Micro Channel, and start delivering MCA compatible machines. Then we could all get on to a next generation of computing made possible by MCA, right?

Wrong, apparently. IBM has thus far been unable to differentiate the Micro Channel from previous PC architectures — except negatively in that MCA compromises hundreds of millions of dollars worth of installed and still shipping PC XT and AT expansion boards.

One of the sources of incompatibility is the smaller form factor for MCA add-in cards. By reducing their allowable size by 40%, IBM assured that building new boards will require more expensive ASIC and surface mounting technologies.

These processes, however, require relatively large up-front costs, and therefore high-production volumes to be economical. Many board manufacturers have not been willing to risk the fixed costs to deliver PS/2 cards so long as PS/2 volumes are uncertain.

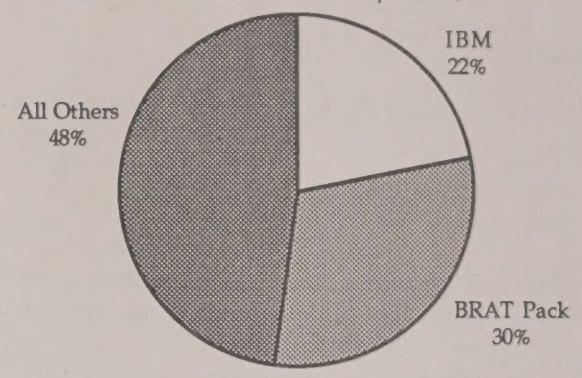
Hence, a move to a MCA machine means two things to PC-compatible users. First, it means burning old boards; and second, going without many add-in gadgets of the sort that initially attracted so many to the PC architecture.

Bolstered by their collective realization that MCA machines have performed poorly in the market and that together they control a larger market share than IBM, in terms of both units shipped (in the U.S., 35% to 27%) and retail value (in the U.S., 30% to 22%), the slaves are in open revolt and threaten to subjugate the master.

IDC research indicated that during most of 1987 non-MCA PS/2, especially the 8086-based Model 30, generated the majority of PS/2 sales. Sales of MCA PS/2s didn't begin to pick up until late in the year, after the channel was so overstocked with PS/2 model 50s, 60s, and 80s as to have little else to sell.

Who's Got the Power to Set Standards? U.S.-based Vendors of Personal Computers, Value of 1987 U.S. Shipments

(Source: International Data Corporation, 1988)



Total $20.5B

Thus, while the switchover to higher-priced 80286- and 80386-based machines drove the retail shipment value of non-IBM PCs in the U.S. up over 62% in 1987, IBM's U.S. PC revenue, saddled with much low-end XT replacement business and depresessed pricing to clear the channel, inched up just over 6%.

Still, this represents an improvement on IBM's part over its 1985 and 1986 efforts, years in which its U.S. retail shipment values actually declined by 4% and 9%, respectively. IBM's last three years offer stark contrast to the company's phenomenal PC success at the beginning of the decade.

What Did You Do Big Blue?

In 1981, through the efforts of an independent business unit (the Entry Systems Division, or ESD) separate from the Armonk bureaucracy, IBM created a personal computer, the IBM PC, based on technology largely supplied by outside suppliers. This gave rise to "PC Clones" who employed IBM's open architecture to deliver their own product. PC prosperity touched many, especially IBM.

Eventually IBM's bureaucracy became aroused by the success of ESD and moved to rein it in. However, the bureaucracy was unable to

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Today's Micro Channel vs. Extended Industry Standard Architecture Debate, According to the Renegades.

(Source: Zenith Data Systems)

FEATURE	MCA	EISA
Industry Standard Bus	Limited availability of third party peripherals. Incompatible with previous XT and AT standards.	Open architecture provides current as well as future compatibility.
32-bit Architecture	Yes.	Yes.
System Memory Configuration	Requires more expensive memory and/or logic to configure above 16MB.	Use up to 4GB of system memory with less expensive DRAMS.
Bus Arbitration	Yes.	Yes.
Platform for Board Development	Requires independent development of 32-bit cards.	Industry standard VLSI chips to assist in development of 32-bit cards.
32-bit DMA Support	Limited to 16-bit DMA transfers between devices.	Allows for 32-bit DMA transfers across the full 4GB address space supported by the 80836.
Auto Configuration Control	Yes.	Yes.
Expansion slots	8 slots.	15 slots.
Board Size	34.5 spare inch option cards.	Larger 63 square inch option card allows more room for third party expansion board development.
Slot Power Consumption	Provides less than 2 amps, requires more expensive low power components.	Provides 4.5 amps, ample power for intelligent peripherals.

Please note: In reprinting Zenith's analysis, the Gray Sheet endorses neither its accuracy nor fairness. The goal is to communicate the issues as perceived by the founders of EISA.

sustain IBM's competitive advantage in the PC market. Smaller players, like Compaq, began to supply more innovative products offering better price/performance than IBM. Five years after introducing the PC, in 1986, IBM captured a smaller share of its own PC market than its clone competitors.

IBM's transition from undisputed to embattled leader of the PC market was remarkably quick. The company lost its effectiveness competing on the open innovation curve it had established. Its mainframe mentality dictated incremental improvements in product price/performance. But much of the competition, unconstrained by this thinking, jumped to introduce machines built with faster chips, bigger and quicker disks, superior monitors, etc.

Armonk's response? When a bureaucracy like IBM has trouble adjusting to a rapidly changing environment, it often tries to force the environment to adjust to it.

Thus was born the Micro Channel: a technically advanced, well-documented I/O bus design suitable for powerful desktop machines, low-end multi-user systems — and IBM's main-

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frame-biased bureaucratic routines.

The BRAT Pack's Beef

Occasionally, however, the environment snaps back. The BRAT Pack rightly complain about certain of the Micro Channel's features. For instance, IBM will have to redesign MCA to support memory caching.

But specific technical characteristics of the MCA are not so much the issue for the BRATs as their inability to shape the MCA to meet their needs. With the performance the Intel 80486 expected to be in the 7 MIPS range, the EISA renegades are looking to some day deliver more powerful PC server systems to directly compete with minicomputers.

These systems, however, may require higher-performance I/O devices than are possible given the MCA's current specifications.

IBM, one might suspect, could be less enthusiastic about Intel microprocessor-based servers able to deliver minicomputer performance. It is not surprising, then, that MCA was designed with lesser-performing, smaller-scale systems in mind.

Indeed, the only instance of unambiguous MCA benefit over the AT bus yet proffered by IBM is the recently introduced PS/2 RPG II Application Platform and Toolkit. Under OS/2, these two programs will provide very cost-effective access to S/36 RPG II applications for workgroups of up to eight users in size. This is the type of application the industry standard AT bus, because of inadequate resource sharing mechanisms, cannot support.

It seems clear that the most distasteful feature of the MCA to the EISA crowd is IBM's complete control over its ultimate positioning. So long as they subscribe to IBM's I/O specs, the renegades implicitly adhere to whatever role IBM might choose for them.

Which most likely will not include selling more expensive desktop systems against 9370s or AS/400s.

Winners and Losers

IBM's inopportune introduction the Model 30 286 serves only to throw gas on the fire. Two systems were announced, one with a 20MB fixed disk drive, and one without. Both employ a one-wait state Intel 10 MHz 80286 as CPU and come standard with 512KB RAM on the motherboard (expandable to 4MB), 3.5" diskette drives, and VGA. They are being positioned as DOS 4.0, and not OS/2, machines in search of AT upgrade business.

From the *Gray Sheet's* perspective, three groups of PC customers could each react differently to these events.

1. PS/2 customers, those who decided to fully embrace IBM's vision without demonstrable proof, could begin to second guess Big Blue. If

One Sure Winner: Apple

The confusion sure to result from this little skirmish has the potential to hurt everyone in the PC compatible market. As customers look down the road a few years they will have to wonder: If only one PC architecture based on the Intel microprocessor is to emerge victorious, whose will it be?

Already customers are being asked to migrate to a new operating environment, OS/2 and Presentation Manager. Now they face a double bifurcation (quadfurcation?).

Apple, on the other hand, has it now, so to speak. And it keeps getting better. The just introduced Mac IIx is built with Motorola's newest 68K chip, the 68030. The new chip executes instructions on average 15% faster than the current Mac II's 68020 chips. Other hardware improvements enhance the Mac's ability to run Unix and other multitasking operating systems.

In contrast to the irresolution of the IBM PC world, the Mac's stability could make it appear to the business personal computing community as an even more solid alternative than before.

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What Has IBM Learned?

Observing IBM's behavior in the PC market one has to wonder what it portends for IBM's future as a competitor in the overall open systems scheme.

Clearly, in 1988 IBM has stressed the need to be more competitive, from its complete restructuring in January (see the *Gray Sheet*, 23:20) to its most recent decision to bite a bullet and deliver a PC AT kicker.

Other actions taken by Armonk indicate the company is in adapt mode. IBM has this year ventured into a large number of partnerships, going outside of the corporation's confines to access new and interesting technologies.

Agreements with Metaphor for its graphic DBMS front-end, Apollo for its NCS, and, of course, OSF spring to mind. More of these types of deals are expected in the near future (e.g., Steve Jobs' Next Computer).

Organizationally, too, there are indications that IBM is in the process of seeking wholly new alternatives, not just refining old views to fit a new world. Witness the length of time it took Armonk to replace George Conrades as head of the Personal Systems Division.

It has been over eight weeks since IBM transferred Conrades to head the US Marketing & Services Group, replacing Ed Lucente. Recently, Richard Gerstner, formerly VP IBM World trade Asia/Pacific, was named to head Personal Systems (and not ESD head Bill Lowe). Lucente will replace Gerstner in Japan, a move which, some feel, returns him to the fast track.

No doubt IBM's activities in the future will continue to manifest the tensions and uncertainties of organizational change. But recent events are promising. It appears as though IBM is reviewing its categorical assumptions about itself and its industry. Hopefully, the miscalculations made with PS/2 won't be repeated in other domains as IBM adjusts to the trend towards open systems.

these customers interpret the Model 30 286 as an IBM retreat, more than Armonk's ability to sell PS/s could be jeopardized.

IBM, to many in the computer industry, is a PC company. A confused PC strategy pollutes all messages about all products. The message most easily dirtied, because of its ambitious and intangible nature, is also the most important to IBM: SAA.

IBM's string of successes in 1988 — MVS/ESA, better revenue and earnings growth, OSF, AS/400, etc. — have sustained, indeed enhanced, IBM's credibility to commercialize its "grand unification theory." This bit of bad PC news could damage IBM's momentum, and throw off the delicate balance between reality and promise IBM has been working so hard to cultivate.

2. Considering buyers who may have been critical of the MCA, the bad news for IBM is that ignoring future IBM strategic announcements gets easier. The good news is buying IBM PCs is also easier. The PS/2 Model 30 286 is attractively priced. On the street the diskless version could sell for as low as $1500, while the 20MB fixed drive model should fetch about $2000.

That's not to say that the price/performance level of the Model 30 286 will compel clone customers to flock to IBM, but it should be enough to keep Blue's old PC AT customers buying IBM.

3. Customers heretofore uncertain about committing to one or the other architecture may, on balance, tilt towards AT machines and the derivative EISA. On the one hand, they could perceive IBM as hedging its MCA commitment. And on the other, they could determine that EISA replicates MCA benefits without MCA's proprietary costs.

The events of September 13th net to a loss for Big Blue. On the credit side, the PS/2 Model 30 286 will help stem IBM's sliding market share. But on the debit side are blows to IBM's credibility and, more importantly, the risk that it could lose control of the I/O bus architecture standard for PCs and, ultimately, its product positioning in the small-to-low-end-medium-scale market.

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Digital Scans Workstation Terrain, Turns to MIPS for RISC Technology

Between now and 1992, workstations will continue to be one of the hottest growth areas in the computer industry. IDC projects a worldwide CAGR of nearly 30% here.

As is often the case in fast growth markets, leadership is up for grabs. Sun, by virtue of its success these past few years, is an early favorite; Digital and IBM, by virtue of being Digital and IBM, are also expected to be forerunners.

But while the particulars of which vendors are likely to be long-term winners are still up in the air, what is being brought down to earth is what will constitute the winning strategies: Unix and RISC.

Today, RISC designs account for 20% of the worldwide value of workstations shipments by U.S.-based vendors. By 1992, 55% of this value will derive from RISC sales.

As for Unix, just over 75% of the workstation units shipped by U.S.-based vendors were Unix systems. By 1992, 83% of all workstation ships will be Unix-based.

Today, the largest shipper of proprietary workstations is Digital. But DEC is looking at 14% growth in the proprietary segment over the next five years.

Far greater opportunity is available in the RISC segment of the market. The value of the market for RISC-based workstations will grow nearly 59% per annum through 1992.

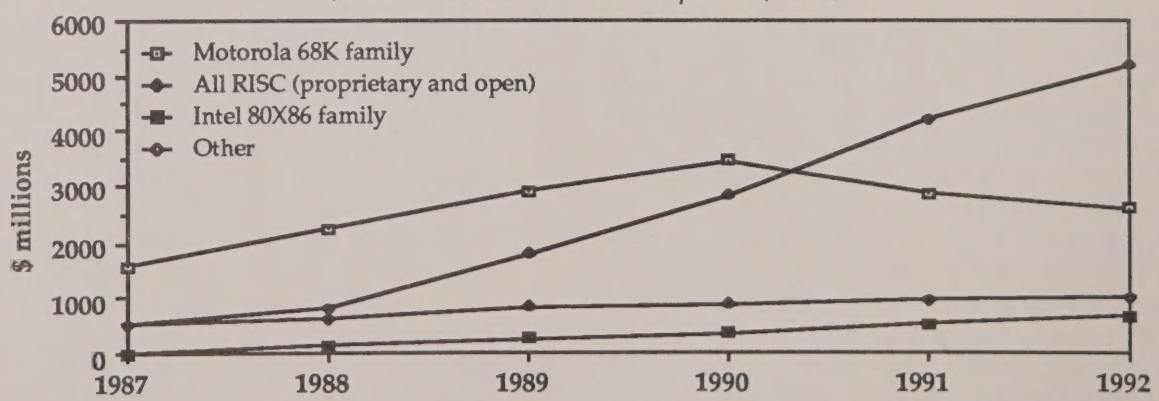
Earlier this summer rumor leaked out that DEC was shutting down development of a proprietary RISC design to pursue a RISC technology transfer agreement with highly-respected MIPS Computer.

It's rumor no more. No product or shipment details are available, but Digital expects to work with MIPS to build a family of RISC machines. To help insure itself, Digital will purchase a minority interest in MIPS (initially 5%, up to a maximum 20%) and has the option of appointing an individual to the MIPS Board of Directors.

For MIPS, it's a much needed major design win. This type of arrangement is not new to MIPS. Earlier this year they announced an agreement with Kubota of Japan, whereby the Japanese manufacturing giant would invest $25 million in MIPS, and assemble and distribute MIPS systems in Japan.

Workstation Market Forecast by Processor Type, Worldwide Revenues of U.S. Vendors, 1987-1992

(Source: International Data Corporation, 1988)



Note on the chart: Data represented herein is for technical workstations (TWS) only, not all systems built with any given microprocessor. For instance, Motorola 68K chips will continue to be the diet of a number of PC machines, such as the Apple Mac. However, only those Macs installed as technical seats are counted here.

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1Q89 CLUBS NAS, WHO KICKS AS LINE. The one-time $16.6 million charge stemming from restructuring its Datachecker operations didn't help, but it was slowing mainframe sales which took the biggest bite out of NAS' bottom line. Pressures on its Information Systems Group resulted in a net loss of $30.5 million for the quarter ending August 28, despite an unseasonally strong demand for its semiconducters. To help rectify the situation, NAS has pledged to reduce the cost base of its computer systems business and has kicked its AS mainframe line.

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The deal is the one of the largest ever in the software industry, and it puts CA about that much closer to the $1 billion mark. In 1987, ADR's database, programming tools, and systems software business generated about $170 million, growing about 30% over 1986. For Ameritech, well, they spent approximately $225 million for ADR three years ago.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR SEPTEMBER 15, 1988 • VOL. 24, NO. 6 PATRICK J. MCGOVERN, PUBLISHER

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Inside: 2Q88 Money Matters, p.3.

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There is relatively little evidence of successes in the more competitive commercial market.

AT&T's problems are not simply a function of bad planning, but of difficulties in changing entrenched patterns of behavior set in place

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An Evaluation of AT&T's Dwindling Options

(Source: International Data Corporation, 1988)

OPTION	ASSUMPTIONS	MAJOR RISKS	ATTRACTIVENESS
Disregard-the-OSF I: Do nothing.	Widespread suspicion about OSF. Industry will follow AT&T and likewise disregard OSF.	Why would industry follow AT&T unless it provides alternative direction? Because it calls on the phone and asks nicely?	Very unattractive. Industry already showing signs of warming to OSF initiative. AT&T would probably find itself isolated. Least likely.
Disregard-the-OSF II: Wait for entropy.	Sponsors can't possibly work together. Tensions could become obvious near term during process to define user interface (UI).	IBM and DEC may not be out to undermine Unix. Proprietary vs. open message from each appears genuine, and makes intuitive sense. If OSF UI bid is successful, catch-up may be impossible.	Attractive. Unless AT&T wants to actively influence UI process, may lose nothing by waiting until OSF's November UI meeting to to observe behavior. A good fall-back option.
End game. Exit hardware (HW) business.	HW becoming commodity. Don't want to threaten potential systems integration (SI) business by uncoordinated hardware activities.	May have to absorb higher HW costs than SI competitors who are also HW suppliers. At the least, lower SI margins could result; at worst, uncompetitive bids.	From an economic standpoint, attractive. But runs contrary to all statements. AT&T corporate strategy seems predicated on HW business. Ego at stake. Not likely.
Embrace OSF. Work to succeed within competitive framework provided by OSF. Perhaps spin Unix out to OSF.	Can grab political high ground within Foundation and retain Unix leadership status.	Few resources to play hardball with— kernel technology from IBM; UI not likely to be based on Open Look. Will probably have to reposition Sun relationship, a prime factor in recent small successes.	Most attractive. Can be incrementally pursued: join first, spin out Unix when and if comfortable. Sun relationship being re-examined anyway. Most likely.
Spin Unix out as separate entity. In effect, establish an alternative OSF.	Marketplace will be appeased by indirect control. Sun, Unisys, NCR, CDC, et al. will support.	Where to spin Unix out to? Separate arm of AT&T, criticism could continue; alternative OSF, still risk losing all control.	Most radical, and AT&T is by nature a conservative organization. Only after all other options are exhausted.

during more than 60 years of regulation, and a few unreasonable assumptions about its competitive position.

When we speak of entrenched patterns of behavior, we are not speaking solely of Ma Bell. In spite of the deregulation of the phone business the Federal Communications Commission, Congress, and the Federal bench have perpetuated outmoded decision-making systems. This has the effect of reinforcing AT&T's old habits.

It's very difficult to be nimble and quick when wearing the remnants of regulatory shackles. No wonder the folks dressed in blue suits, engineering smocks, and Hawiian shirts seem always able to run circles around AT&T.

As for assumptions, things just haven't turned out as expected over the last five years. Using 20/20 hindsight, the *Gray Sheet* notes the following:

- AT&T's vaunted Bell Labs has not evolved into a dominating competitive force. The company still hasn't shown a knack for recognizing and realizing the commercial potential of its own research. AT&T still seems more comfortable with systems and operations research activities geared towards long-lines plant optimization. The $8 million KORBX system for solving massive linear equations is the most recent product to descend from the lab.

- AT&T's massive sales force has been less than effective moving computing equipment. The great majority of the Fortune 1000 continue to treat telecommunications as an internal utility, separate from data processing. Unfortunately for AT&T, this state of affairs is only slowly

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changing. Its friends in user telecom operations often don't have much say in computer hardware and software procurement decisions.

• The firm's financial position has been battered since deregulation. The switch to shorter terms for capital depreciation and the need to hire new expertise has put a tremendous cost burden on AT&T during a time of increasing long-lines rate competition. Money is perhaps tighter today than expected.

What Will AT&T Do?

Remember the big, clumsy, and slow kid who owned the only basketball in the neighborhood? He couldn't play very well — football was his forte — but the price of using his stuff was he got to attempt most of the scoring. Otherwise, he would threaten, no game.

It wasn't worth questioning his right to behave like that, but neither was it necessary to put up with it for longer than a short period of time. Eventually, his mates threatened to either forcibly take the basketball from him, or collect enough money from each interested player to purchase an alternative ball, and then act to kick him off the court for good.

In many respects, this describes AT&T's behavior and the OSF response to it. AT&T is having its ball taken away.

On the preceeding page is a table outlining AT&T's options. In light of the company's capabilities and position in the industry, the *Gray Sheet* believes Ma Bell's first move will be to join the OSF soon, perhaps this month.

There are serious internal impediments to this move (e.g., what to do with the 600 folk devoted to tending the Unix flame at AT&T). But these will probably be discounted by AT&T's management.

The biggest question for AT&T is: How can it guarantee a convergence of Unix given the OSF's charter to cultivate independent vendor embellishments?

AT&T is likely trying to institute some checks and balances within the OSF to collapse the space of Unix alternatives. OSF will likely acquiesce to a degree and start stressing compliance in its message.

AT&T's second move could be to spin Unix off, but that's less likely to happen as quickly.

The longer the confrontation persists, the longer will major users (such as the Federal Government and GM, among others) put off procurements requiring open systems. These users and nonaligned vendors are bringing heavy pressure to bear on both sides to settle their differences.

For AT&T that means it will probably be forced to play by the OSF's rules from now on.

2Q88 MONEY MATTERS

Once again, slow growth in Armonk is checking the revenue growth of the computer industry.

Without IBM, revenue growth in the systems market would have been nearly 19% in the second quarter; the total would have been just over 21%. Contrast that with the actual 13% and 15% figures respectively.

IBM's effect is more pronounced on the bottom line. Its nearly $600M restructuring charge all but wiped out profit growth in the systems business.

Without IBM's influence 2Q88 earnings in the systems market would have been up more than 21%.

Bolstered by IBM's strong first quarter, year-to-date figures are a bit more positive. For the total market, revenue and earnings growth without IBM would have been 20% and 23%.

One very uneven subgrouping is PC storage. Product cycle transitions are wreaking havoc on some (Seagate, Micropolis), and spurring others (Maxtor, Miniscribe).

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Selected Information Industry Financial Results, Second Quarter 1988

(Source: Company Financial Reports)

Category/ Company	2Q/88 Rev. ($M)	2Q/87 Rev. ($M)	%Change	2Q/88 Earn. ($M)	2Q/87 Earn. ($M)	%Change
Computer Systems						
Alliant*	14.3	18.7	-24%	(8.6)	2.0	NA
Altos*	45.7	40.5	13%	13.1	3.0	337%
Amdahl	423.8	341.0	24%	53.9	31.0	74%
Apollo	143.5	132.2	9%	(7.9)	7.6	NA
Apple	993.1	637.1	56%	58.4	47.4	23%
Britton Lee	7.5	5.3	42%	0.0	(4.2)	NA
Commodore	215.2	190.4	13%	12.2	2.1	481%
Compaq*	456.8	267.5	71%	58.6	30.7	91%
Computer Consoles	42.7	35.8	19%	3.1	0.9	244%
Concurrent	61.2	68.6	-11%	3.5	3.2	9%
Control Data	951.7	785.9	21%	9.2	(5.5)	NA
Convergent Tech.	106.6	98.9	8%	2.1	0.4	425%
Convex	25.2	16.7	51%	1.2	2.2	-45%
Cray	134.3	124.9	8%	19.1	19.6	-3%
Data General	330.7	313.6	5%	1.9	(65.1)	NA
Digital	3,339.4	2,669.1	25%	401.0	377.3	6%
Gould*	196.4	189.8	3%	6.8	11.2	-39%
Harris*	538.4	562.1	-4%	1.8	26.2	-93%
Hewlett-Packard*	2,434.0	2,054.0	19%	192.0	148.0	30%
IBM*	13,599.0	12,798.0	6%	964.0	1,178.0	-18%
Kaypro	16.9	26.2	-35%	(1.6)	(0.8)	NA
MAI Basic Four*	112.3	79.1	42%	6.8	6.8	0%
MASSCOMP*	18.1	21.1	-14%	(10.1)	2.7	NA
NBI	32.4	41.6	-22%	(11.1)	0.4	NA
NCR	1,497.0	1,359.6	10%	112.4	98.6	14%
Prime*	408.4	236.0	73%	21.7	27.6	-21%
Pyramid	20.2	13.7	47%	2.3	0.8	188%
Sequent	17.1	9.1	88%	1.4	1.2	17%
Silicon Graphics	46.2	29.1	59%	3.5	1.9	84%
Stratus	62.9	42.7	47%	6.7	3.9	72%
Sun Microsystems	365.1	185.9	96%	25.3	10.9	132%
Tandem	339.0	267.8	27%	17.3	25.9	-33%
Tandon*	81.1	57.8	40%	6.0	5.6	7%
Tandy	813.5	736.7	10%	57.2	44.4	29%
Teradata	29.8	15.6	91%	4.8	1.5	220%
Unisys	2,392.7	2,275.0	5%	162.3	121.2	34%
Wang	822.8	824.0	0%	13.4	32.0	-58%
Subtotal	31,135.0	27,571.1	13%	2,203.7	2,200.6	0%

**Alliant 2Q88 income includes $5.5M charge for merger/consolidation charges reflecting the acquisition of Raster Technologies. Altos 2Q87 income included $1.1M gain from sale of portion of Informix investment; 2Q88 income includes $11M from sale of rest. Compaq 2Q88 income includes $9.7M nonrecurring gain due to increase in value of its Conner Peripherals investment subsequent to IPO. Gould 2Q88 revenues from continuing operations; income from continuing operations before extraordinary items. Harris 2Q88 income includes most of $33.1M restructuring charge for the fiscal year ending June 30. Hewlett-Packard for quarter ending July 31. IBM 2Q88 income includes $600M pretax charge for first half consolidation, and part of a $315M credit for an accounting change on taxes. MAI Basic Four 2Q88 income included $1.0M in tax loss carryforwards. MASSCOMP 2Q88 income includes $8.2M restructuring provision for merger with Concurrent Computer; 2Q87 includes $1.4M tax carryforward. Prime 2Q88 income includes $5.1M charge for withdrawal of MXCL5; 2Q88 revenue includes Computervision, while 2Q87 does not; if 2Q87 Computervision revenue were added to Prime's, revenue growth for the quarter would have been 9.6%. Tandon 2Q87 income included $1.0M from discontinued operations. Teradata 2Q88 income includes tax carryforward credit of $1.9M.*

Peripherals and Communications						
Alloy	9.4	12.1	-22%	(3.0)	0.8	NA
AST Research	135.8	63.2	115%	7.7	2.9	166%
Cipher Data*	55.9	42.2	32%	5.1	1.0	410%
Dataproducts	85.5	77.4	10%	0.8	0.3	167%
Emulex	34.2	27.4	25%	1.3	1.1	18%
Esprit	5.7	3.5	63%	(1.3)	(1.5)	NA
Irwin Magnetic Sys.	12.1	11.5	5%	0.0	0.8	-100%
Key Tronic*	33.0	29.1	13%	(11.1)	1.6	NA

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Maxtor	80.4	50.9	58%	2.0	1.7	18%
Micropolis	97.5	70.9	38%	1.2	6.8	-82%
Miniscribe	170.5	81.1	110%	14.7	7.6	93%
Network Systems	31.0	30.6	1%	2.9	4.9	-41%
Paradyne	58.4	58.1	1%	(2.9)	(1.5)	NA
Priam	38.7	35.1	10%	1.4	(2.8)	NA
Quantum*	38.9	40.2	-3%	0.6	(3.5)	NA
Rexon	41.6	27.3	52%	1.4	2.8	-50%
Seagate	368.4	250.1	47%	16.5	37.2	-56%
StorageTek*	203.3	175.3	16%	7.1	7.8	-9%
Western Digital*	276.8	145.1	91%	14.7	14.4	2%
Wyse	152.1	84.1	81%	8.4	5.7	47%
Xebec	6.1	10.3	-41%	(1.9)	(34.0)	NA
Subtotal	1,935.3	1,325.5	46%	66.1	55.3	20%

**Cipher Data 2Q88 income includes $3.4M royalty from patent litigation. Key Tronic 2Q88 income includes $4.2M toxic landfill settlement, $2.7M equipment writeoff, $2.3M inventory markdown, $1.3M investee corporation costs, for a total of $10.5M in extraordinary expenses. Quantum 2Q87 income includes $3.5M charge for project cancellation. StorageTek 2Q87 income included $11.2M gain on disposition of discontinued operations. Western Digital 2Q87 income includes $2.2M in carryforwards.*

Software/Services/VARs						
Ashton Tate*	71.9	63.6	13%	11.5	10.1	14%
Ask Computer	46.5	31.4	48%	4.0	2.6	54%
ADP	393.2	355.3	11%	48.6	40.1	21%
Boole & Babbage	14.0	10.3	36%	0.8	0.5	60%
Comdisco*	321.0	274.0	17%	21.0	25.0	-16%
ComputerAssociates*	185.7	139.3	33%	16.9	9.2	84%
Computer Sciences	299.3	274.6	9%	11.7	9.5	23%
Cullinet*	43.9	49.0	-10%	(5.3)	(8.0)	NA
Cybertek	5.2	5.2	0%	(0.2)	(0.3)	NA
Daisy Systems	29.9	24.1	24%	1.7	(10.5)	NA
Data I/O	18.3	16.8	9%	1.4	0.6	133%
EDS	1,196.3	1,076.3	11%	95.7	72.0	33%
Informix	26.1	15.1	73%	1.5	1.9	-21%
Intellicorp	5.4	5.8	-7%	0.4	(2.7)	NA
Intergraph	203.5	160.2	27%	23.4	16.8	39%
Interleaf	17.1	10.5	63%	0.1	0.7	-86%
Lotus	122.1	94.0	30%	17.3	16.3	6%
MSA	68.9	82.6	-17%	5.8	18.7	NA
Mentor Graphics	72.1	53.9	34%	8.1	4.7	72%
Microsoft	170.5	99.8	71%	30.0	17.3	73%
Software Pub.	20.1	8.3	142%	3.9	0.9	333%
Symbolics	16.2	29.2	-45%	(21.3)	(1.5)	NA
VM Software	10.6	6.8	56%	1.3	0.1	1200%
Subtotal	3,297.7	2,807.9	17%	304.9	233.5	31%

**Ashton-Tate for quarter ending July 31. Comdisco 2Q87 income includes $10M from discontinued operations. Computer Associates 1987 figures restated to reflect UCCEL acquisition. Cullinet for quarter ending July 31; 1987 revenue not adjusted for subsequently divested susidiaries, etc.*

Semiconductors/Components						
AMD	308.1	250.8	23%	26.1	5.4	NA
Chips & Tech.	43.4	27.6	57%	6.3	4.0	58%
Intel	726.7	439.0	66%	130.7	46.5	181%
LSI Logic	92.5	59.9	54%	7.2	0.3	2300%
Texas Instruments	1,558.0	1,371.6	14%	91.8	66.4	38%
VLSI Tech.*	53.7	42.0	28%	3.0	1.7	76%
Subtotal	2,782.4	2,190.9	27%	265.1	124.3	113%

**VLSI Technology 1987 income restated to reflect adoption of FASB 86.*

TOTAL	**39,210.5**	**33,973.6**	**15%**	**2,812.7**	**2,603.0**	**8%**

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Selected Information Industry Financial Results, First Half 1988

(Source: Company Financial Reports)

Category/ Company	1-2Q/88 Rev. ($M)	1-2Q/87 Rev. ($M)	% Change	1-2Q/88 Earn. ($M)	1-2Q/87 Earn. ($M)	% Change
Computer Systems						
Alliant	27.8	30.7	-9%	(7.7)	4.4	NA
Altos	88.5	80.9	9%	13.7	5.9	132%
Amdahl	791.4	659.5	20%	97.0	56.2	73%
Apollo	307.4	255.6	20%	2.5	14.0	-82%
Apple	1,860.2	1,212.4	53%	138.0	81.3	70%
Britton Lee	14.9	11.0	35%	(0.1)	(6.2)	NA
Commodore	415.5	359.9	15%	21.8	3.1	603%
Compaq	896.3	478.5	87%	105.5	50.8	108%
Computer Consoles	81.8	71.4	15%	6.3	1.7	271%
Concurrent	130.5	132.7	-2%	7.1	5.6	27%
Control Data	1,853.9	1,607.6	15%	16.9	1.7	894%
Convergent Tech.	199.3	180.3	11%	(2.1)	(10.7)	NA
Convex	47.3	31.1	52%	2.2	4.8	-54%
Cray	280.2	339.1	-17%	45.5	76.9	-41%
Data General	680.4	628.8	8%	22.0	(74.1)	NA
Digital	6,163.4	5,079.1	21%	706.2	684.8	3%
Gould	403.0	373.0	8%	17.7	19.0	-7%
Harris	1,063.1	1,084.4	-2%	26.5	48.1	-45%
Hewlett-Packard*	4,930.0	4,071.0	21%	394.0	310.0	27%
IBM*	25,348.0	23,479.0	8%	2,212.0	1,963.0	13%
Kaypro	36.4	55.1	-34%	(3.8)	0.0	NA
MAI Basic Four	217.7	157.2	38%	13.1	12.2	7%
Masscomp	37.2	41.5	-10%	(9.9)	4.3	NA
NBI	64.7	83.2	-22%	(33.2)	(1.3)	NA
NCR	2,778.4	2,481.1	12%	186.6	160.2	16%
Prime*	772.1	457.8	69%	36.2	39.4	-8%
Pyramid	39.1	26.3	49%	4.3	1.2	258%
Sequent	31.4	16.6	89%	2.5	2.1	19%
Silicon Graphics	88.2	51.6	71%	6.8	3.4	100%
Stratus	117.1	80.2	46%	12.6	7.6	66%
Sun Microsystems	624.8	329.1	90%	39.5	21.1	87%
Tandem	648.4	513.5	26%	40.6	48.3	-16%
Tandon	161.5	117.6	37%	13.2	10.7	23%
Tandy	1,652.6	1,513.6	9%	121.3	94.8	28%
Teradata	55.1	27.2	103%	8.9	2.3	287%
Unisys	4,760.4	4,690.8	1%	311.6	231.4	35%
Wang	1,590.7	1,569.9	1%	36.1	37.9	-5%
Subtotal	59,258.7	52,378.3	13%	4,611.4	3,915.9	18%

**Hewlett-Packard for quarters ending April 30 and July 31. IBM 1Q88 income restated to include effects of $315M credit over the first half of 1988 due to an accounting change on taxes. Prime 1988 revenue figures include Computervision, while the 1987 figures do not; if Computervision revenue were added to the 1987 figures (2/3 for 1Q), revenue growth would be 12%.*

Peripherals and Communications						
Alloy	20.6	22.9	-10%	(2.9)	1.6	NA
AST Research	241.5	118.6	104%	13.0	6.2	110%
Cipher Data	100.6	88.2	14%	7.6	2.4	217%
Dataproducts	181.5	162.3	12%	(14.1)	2.0	NA
Emulex	66.0	53.1	24%	3.7	2.4	54%
Esprit	11.5	7.7	49%	(1.6)	(2.2)	NA
Irwin Magnetic Sys.	24.2	26.1	-7%	0.1	1.8	-94%
Key Tronic	78.0	62.8	24%	(12.4)	2.5	NA

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Category/ Company	1-2Q/88 Rev. ($M)	1-2Q/87 Rev. ($M)	% Change	1-2Q/88 Earn. ($M)	1-2Q/87 Earn. ($M)	% Change
Maxtor	166.1	106.4	56%	8.1	6.1	33%
Micropolis	178.0	132.7	34%	8.4	13.0	-35%
Miniscribe	309.0	142.5	117%	25.4	13.7	85%
Network Systems	61.1	50.8	20%	5.8	6.0	-3%
Paradyne	116.0	114.0	2%	(2.8)	(3.5)	NA
Priam	76.2	71.3	7%	2.6	(2.7)	NA
Quantum	81.1	72.1	12%	(7.8)	(0.6)	NA
Rexon	77.3	51.5	50%	4.6	4.8	-4%
Seagate	707.4	517.2	37%	39.7	77.6	-49%
Storage Tek	396.6	355.9	11%	15.6	17.2	-9%
Western Digital	467.5	272.3	72%	22.9	27.2	-16%
Wyse	293.8	165.4	78%	16.2	11.0	47%
Xebec	14.0	32.9	-57%	(4.8)	(36.1)	NA
Subtotal	3,668.0	2,626.7	40%	127.3	150.4	-15%
Software/Services/VARs						
Ashton Tate*	144.3	123.8	17%	22.6	19.2	18%
Ask Computer*	83.5	56.8	47%	6.7	4.2	60%
ADP	811.2	729.0	11%	99.8	79.3	26%
Boole & Babbage	28.0	20.3	38%	1.7	1.0	70%
Comdisco	631.0	580.0	9%	46.0	54.0	-15%
ComputerAssociates*	392.1	285.4	37%	50.8	26.7	90%
Computer Sciences	608.4	565.1	8%	25.6	20.3	26%
Cullinet*	108.2	110.1	-2%	(25.8)	(12.1)	NA
Cybertek	10.9	11.6	-6%	(0.1)	0.0	NA
Daisy Systems	58.5	47.9	22%	3.1	(15.4)	NA
Data I/O	32.9	33.5	-2%	1.4	1.6	-13%
EDS	2,318.4	2,114.0	10%	184.8	136.6	35%
Informix	51.9	28.1	85%	4.0	3.6	11%
Intellicorp	10.4	11.3	-8%	0.1	(2.6)	NA
Intergraph	378.2	288.7	31%	40.5	26.8	51%
Interleaf	35.2	22.3	58%	2.6	1.4	86%
Lotus	239.4	178.8	34%	35.7	30.0	19%
MSA	131.9	135.7	-3%	8.7	14.3	-39%
Mentor Graphics	139.7	104.4	34%	15.0	8.9	69%
Microsoft	332.3	198.1	68%	67.3	36.4	85%
Software Pub.	35.3	19.2	84%	6.7	2.5	168%
Symbolics	33.6	53.8	-38%	(26.1)	(3.4)	NA
VM Software	18.6	13.1	42%	1.9	0.9	111%
Subtotal	6,633.9	5,731.0	16%	573.0	434.2	32%

**Ashton-Tate for quarters ending April 30 and July 31. Ask 1988 figures include NCA. Computer Associates 1987 figures restated to reflect UCCEL acquisition. Cullinet for quarters ending April 30 and July 31, and 1987 revenues not adjusted for subsequently divested subsidiaries.*

Semiconductors/Components						
AMD	592.3	473.6	25%	46.2	8.3	457%
Chips & Tech.	79.5	50.4	58%	11.8	7.6	55%
Intel	1,362.5	833.5	63%	224.4	72.0	212%
LSI Logic	165.6	115.0	44%	11.9	2.4	396%
Texas Instruments	3,025.3	2643.5	14%	177.3	156.3	13%
VLSI Tech.	97.5	80.2	22%	1.5	3.2	-53%
Subtotal	5,322.7	4,196.2	27%	473.1	249.8	89%
TOTAL	**74,883.3**	**64,932.2**	**15%**	**5,784.8**	**4,750.3**	**22%**

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TI's NEW YELLOW ROSE IS SUN SPARC. It's a great move. Texas Instruments gets an obligatory RISC microprocessor in its portfolio; Sun gets the support of the largest U.S. chip manufacturer. The actual details of the agreement and the brouhaha of the announcement could peeve some other SPARC licensees, but that appears to be Sun's way.

Central to the agreement are three points: (1) to initiate its SPARC development, TI will act as second source for Cypress Semiconductor's recently introduced 7C601 20 VAXMIPS CMOS version of SPARC; (2) TI will begin developing, and perhaps in the next two years introduce, a SPARC-based, high-end Unix machine to complement its existing line of AI workstations; (3) TI plans to work with Sun to develop the next generation SPARC microprocessor using TI's advanced EPIC IIB 0.8 micron, triple-level metal BiCMOS process technology.

TI has apparently dedicated its RISC activities to SPARC despite what some believe to be flaws in its design (e.g., variable pin-out and memory management, 32-bit architecture). Why? Probably because of Sun's growing status in the industry and Sun's agreeing to let TI assist in future SPARC design efforts. Aside from its expertise in process technology, TI offers Sun a great deal of knowledge in floating point, graphics, and symbolic processing chip design, each of which could be areas that might help positively differentiate SPARC in the future.

Sun was quick to point out that all five semiconductor partners will be offered a role in the next-generation SPARC design, but by highlighting TI's and Cypress's participation in this drummed-up announcement it may cast a momentary shadow on its relationship with, in particular, LSI and Fujitsu. It will be interesting to see how each reacts.

MATSUSHITA TO BUILD SPARC MACHINE. It dumped its mainframe computer business 24 years ago to concentrate on consumer electronics. Today, no one is bigger in that realm. With approximately $38 billion in 1987 sales, tremendous manufacturing capability, and its generally successful track record in the electronics industry (an initiative to market cheap PC clones failed earlier this decade), Matsushita's reentering the computer industry with an engineering workstation is serious business.

The company will manufacture components based on Sun's SPARC chip, and ship them to the U.S. for final assembly by Solbourne Computer Inc. (formerly SAE Inc.), a domestic subsidiary. Matsushita is the first Japanese company to be granted a license, however indirectly, to build SPARC-based workstations. Currently Fujitsu and Toshiba resell Sun machines under their own nameplates.

GOULD AS GOLD TO NIPPON MINING. In a move viewed by some as indicating a waxing Japanese desire for equity in American high-tech firms, Gould has agreed to be acquired by venture partner Nippon Mining for $1.1 billion. The intended sale still has to be formerly approved by the U.S. Federal Government, but neither side anticipates any snags.

NEW ULTRIX, COMS STUFF FROM DEC. Digital's new ULTRIX-32 version 3 complies with all the major Unix standards and specifications — including the newly approved draft 13 of the IEEE 1003.1 POSIX specification. A new capability known as ULTRIX NFS (Network File Sharing) Clusters supports as many as 16 VAX CPUs or HSC 70s in a distributed file environment. Databases of up to 75 gigabytes are feasible. In addition, the VMS/ULTRIX Connection, the ULTRIX Mail Connection, and the DECnet-ULTRIX version 3 makes it easier for users to integrate ULTRIX and VMS VAXs.

The coms portion of the announcement appears to follow in the footsteps of DECtp. The MicroServer product will facilitate synchronous Ethernet communications. Packet routing software supporting proprietary DEC specs and X.25 will run up to four times as fast as previous DEC programs. New DECnet/SNA software improves DEC's IBM interoperability, including a direct S/370-to-DECnet attach option. Finally, DEC now has OSI/FTAM for "open" file transferring.

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THE GRAY SHEET
Computer Industry REPORT

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Information Technology, Perestroika, and Trade

Even after being garbled in translation, one simple message was clear: the Soviet Union does not indigenously possess the means to meet its growing information technology needs.

So complained six leading Soviet computer scientists and cadres during one stop of a whirlwind fact-finding tour of the U.S. The occasion was the launching of a new IDG Communications publication, PC USSR. Among those attending the dedication was the *Gray Sheet.*

They spoke of a country lacking both an adequate infrastructure for designing, building, and supporting reliable, high-quality computer and communications products, and the necessary superstructure for effectively integrating these products into the workings of what is still a tightly controlled society.

Only occasionally did they indulge in panegyrics to the Soviet Union's technical prowess. A few particulars from their presentation and other *Gray Sheet* research:

- After years of relying on second-generation minilike computers for nonmilitary applications, the Soviets have begun focusing on personal computing.
- Currently, there are fewer than 300,000 personal computers installed in the USSR.
- Most of these are Soviet manufactured and are subject to regular breakdowns. Because service organizations don't exist, once-down computers are often retired.
- There are estimated to be fewer than 1,000 Intel 8088/8086-based IBM-compatible PCs in the USSR. A couple hundred of these are believed to be IBM PS/2 Model 30s, sold since IBM acquired an export license last October, 1987.
- The current five-year plan calls for the manufacture of 1.1 million PCs by 1990, up from a production level of approximately 100,000 units this year.
- Computer training and education is a top priority. The plan calls for 40% of the USSR's PC installations to be spread among the nation's 70,000 schools by the early 1990s. The goal is 15 personal computers per school.
- The Soviets estimate today's total personal computer demand to be in excess of 28 million (16 million education, 12 million industrial enterprise). In a nation of 280 million, that means the state anticipates providing a personal computer to one in every ten people. (In contrast, on average there is currently one PC installed per 6.25 people in the U.S.)
- However, due to widespread institutional conservatism, perhaps less than 25% of the larger systems currently installed (total <10,000) in industrial enterprises are being used in a meaningful way.

But they also spoke of a country in the midst of significant change. Two other far more complex themes emerged during the visit.

First, the Soviet's contend this remarkable demand for information technology is being driven by an even more remarkable phenomenon: Perestroika.

Second, devoid of its own computer industry, the USSR expects America's help.

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Why the USA? Because Russians have a tradition of eliminating the middleman. They believe in going to the source and view the U.S. as the wellspring of high technology.

A Ruble-Rousing Request?

Perestroika (restructuring) can be viewed as an attempt on the part of the Soviet leadership to retire obsolete ways of thinking. Glasnost (openness) is a sanctioned process for critical reflection that, it is hoped, will lead to newer systems of thought.

Information technology will play a critical role in the success or failure of Perestroika and Glasnost. Without it, progress will be difficult to gauge, and the likelihood of conservative backlash will be increased.

The U.S. information technology industry finds itself in an interesting position. How it treats the Soviet Union as a market has enormous consequences in many other social and political realms as well.

There are two components to viewing the USSR as a potential market for U.S. high-tech goods. First is the overall question of global policy.

In the minds of the Soviets, recent conciliatory gestures are not a reaction to an intimidating U.S. foreign policy, but rather stem from the need to remove the military monkey from the back of an overburdened economy and populace. Further demilitarization, they would say, could be expected if we would work to further relax the international climate.

The new emphasis on efficiency in the USSR makes this assertion believable. Insofar as information technology is concerned, microprocessors could be stripped from imported personal computers and applied to military applications, but this would be an enormous waste of value and counterproductive to enhancing the quality of life.

As for human rights, the Soviet leadership would like the existence of Glasnost to put to rest any concerns we have about our technology facilitating a tighter grip for the state on Soviet lives.

There is no doubt that Glasnost combined with more easily accessible information technology will generate tremendous social change in the USSR. Existing institutions were designed for one-way information dispersion — propaganda — by means of Pravda, radio, and TV.

More advanced technology, whether it takes shape as an improved phone system or desktop publishing workstations, will lead to greater opportunities for two-way communications without state interference.

Indeed, one could question whether or not Glasnost is even possible without a much improved, bidirectional information system.

Recent rulings by the Commerce Department and CoCom, the international body charged with regulating trade with the Eastern Bloc, seem to take these points into account. Virtually all 16-bit microprocessors can now be sold into the Soviet Union without case-by-case review.

And many trade experts are calling for increased normalization by simplifying export procedures and expanding the spectrum of allowable products.

However, because we wish to move incrementally, more powerful chips and advanced software technologies (e.g., CAD/CAM/CAE) will for a time remain restricted.

The second set of concerns pertains to the normal risks of doing business on an international scale. Namely, does the Soviet Union possess the underlying social and economic structures needed to support a market? Can they be trusted to protect Western capital and intellectual

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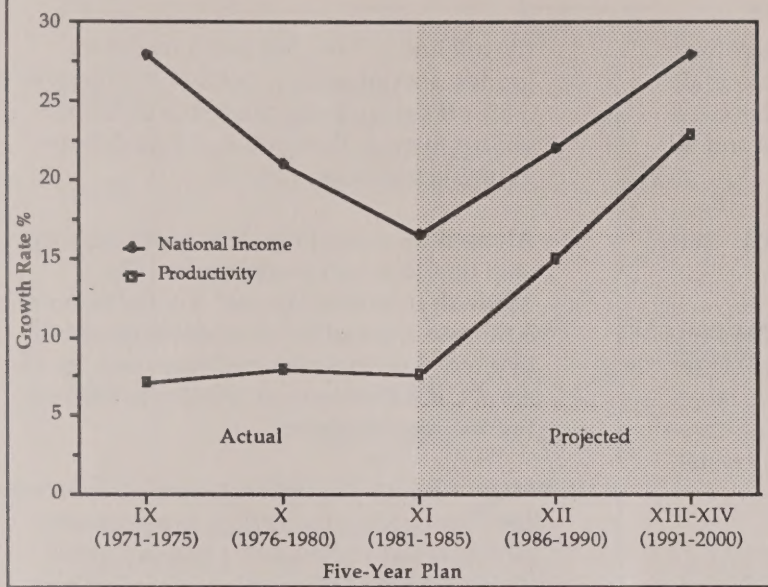
Official State Estimates: National Income and Productivity of the USSR, 1971-2000

(Source: Aganbegyan, Abel. The Economic Challenge of Perestroika, Indiana University Press, Bloomington, IN, 1988. Copyright: International Data Corporation, 1988)



For close to fifty years the Soviet Union's economy experienced enormous expansion in response to state calls for industrialization. The high price paid, however, was widespread waste. Both capital and natural resources were consumed at an incredible rate without regard for the marginal productivity of either.

Beginning in the early 1970s, however, diminishing returns set in, and Soviet growth rates in national income began a precipitous decline.

Today, the economic vogue in Moscow is productivity and more efficient economic systems. While understanding that computers in and of themselves will not halt the slide, the Soviets are banking that the reasonable application of information technology may help make their resources more productive and spur rapid growth.

Here lies a classic Catch-22. Without information technology, liberalizing the system is almost impossible. But without a more enlightened management philosophy in state and industrial enterprises, introducing information technology is almost impossible.

The problem is this: on the supply side, the centralized economy is simply unable to effectively produce and service something as intricate and requiring such cross-discipline cooperation as a computer; on the demand side, information technology, indeed innovation in general, necessitates changes in standard operating procedures, and is thus either avoided or ignored.

To rapidly rise above these impediments, and to display the good faith required to attract capital, the Soviets are willing to relinquish some control over the productive process. They propose joint ownership with U.S. firms, whereby the U.S. company could own up to 49% of the venture.

And as for complaints that the USSR steals Western technology, the Soviet's were very candid in admitting this takes place. But, they countered, it would cease if export controls were relaxed. How else could the USSR expect its intellectual property to be protected?

Caveat Mercator

For now, though, the barriers and risks of entrance to the USSR market are high. A firm possessing enormous resources (e.g., IBM), some specific value (e.g., PC USSR is being published according to an IDG Communications desire to be the leading international publisher of computer journals), or some relatively unique talent (e.g., perhaps the VP of Marketing speaks Russian) may be impelled to invest.

And some may hit it big. Reports are that an IBM PC clone can fetch up to 20,000 rubles (approximately $25,000) in Moscow. Obviously, if introduced in quantity the price will drop substantially, but still there may be room for hefty margins here.

The key phrase is "may be," however. The numbers are tempting, but the climate currently surrounding U.S.-Soviet trade relations is not yet stable enough to justify a major push into the Soviet market. Most firms will wait and see.

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Of Late, 3090 Es Won't Move, So IBM Kicks Them Early

For the last six months many senior IBMers have been living out of suitcases, hopping from glass house to glass house to assure large customers that Big Blue would work to protect any and all 3090 E Model investments.

"That's nice," they apparently heard, "but we'll wait for the 'F-series' anyway."

What could be more frustrating for IBM's Enterprise Systems Group, the folks responsible for S/370 products? Evidence of renewing large-scale systems demand abounds after the February intro of ESA/370, but it just wouldn't crystalize around the existing 3090 E-Models.

Tired of being teased, IBM announced the F-kickers, officially known as the ES/3090 S Models, six weeks earlier than anticipated. Availability for two low-end members has likewise been bumped ahead — to September. By December, all ten S models should be shipping in volume.

True Blue customers who have been fence-sitting, rather than PCMs, appear to be the target of this announcement. Armonk wants customers to buy mainframes now — as in this financial quarter (or this financial year at the latest) — and has instituted a rich variety of product, program, and upgrade options and marketing guidelines designed to "get to yes." Consider the following:

- The ten new machines offer healthy horizontal performance improvements for between 10-15% more dough. The net result is a price/performance (p/p) boot of between 14-19% across the line, within historical norms.

- Incremental growth through the 3090 family is remarkably fine-grained after this announcement, although it was good before. IBM is offering 67 viable field upgrade options. All upgrades will be available by June of next year.

- To make the Es attractive during the wait for the full line of S models and S model upgrades, special pricing deals in the range of 3-5% off list are being offered to customers willing to order E models and E model upgrades before September 30.

- Along these same lines, IBM is selling a two-step upgrade-to-S-models plan. The "Growth Incentive Option" (GIO) discounts 3090 base-E-S and E-E-S model upgrades by, in effect, lowering the pathway cost. Holders of GIOs then have 18 months to exercise the S-upgrade option.

- Major operating system software components can now be leased according to a graduated pricing schedule based on processor value. Previously, IBM offered graduated pricing for software purchases, but only a single monthly charge for software leasing.

- The beleaguered 3990-3 DASD controller has commenced shipping a month early. Although "crippled" in the sense that cache functions remain delayed by microcode snags, the 3990-3 still offers users quadporting (the capability to simultaneously access and transfer data to or from any of four actuators) and nondisruptive installation.

- The base code for MVS/ESA (MVS SP 3.1), which will operate on 3090 Es, is being released one month ahead of schedule.

- Moreover, customers who in the last year purchased MVS/XA under graduated pricing will receive two years free use of MVS/ESA.

Base 3090 customers who don't accept IBM's invitation to do the E-model shuffle will face stiff penalties come the first of December. Prices for most base-to-E conversions will rise approximately 9% at that time.

Doing It with Performance

IBM touts the new systems as the most power-

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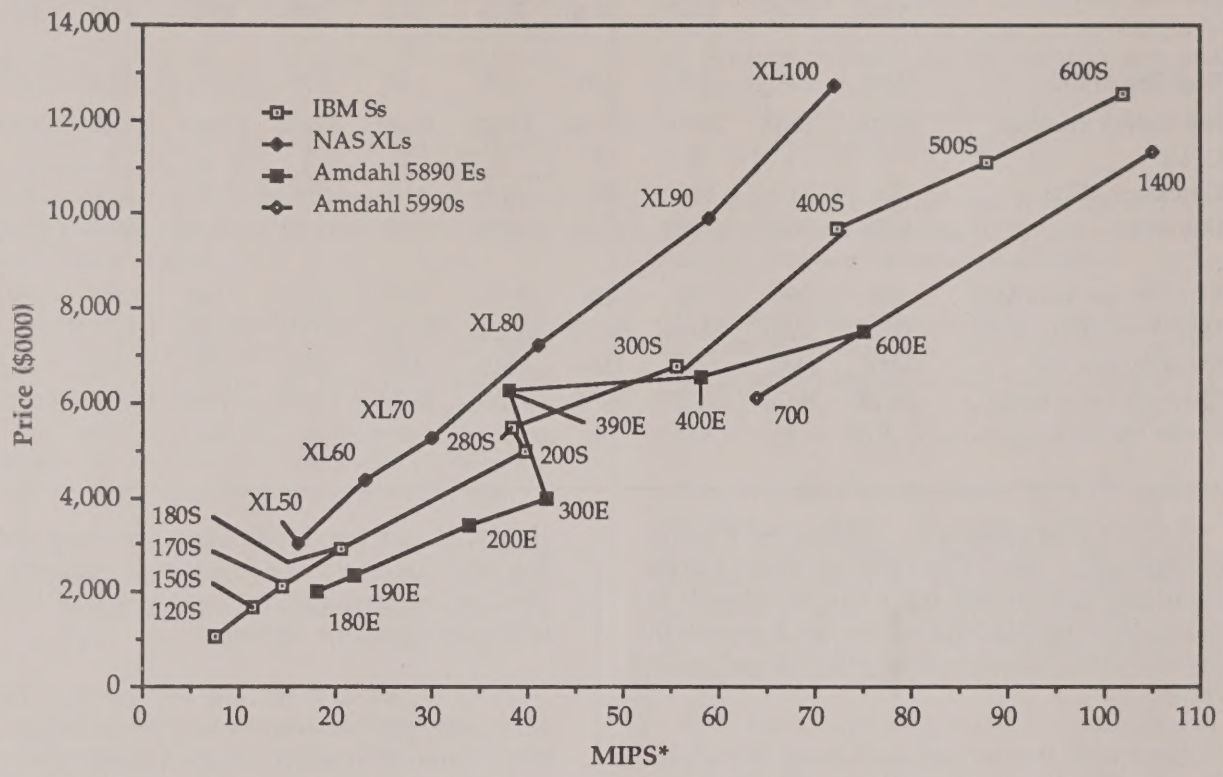
Price/Performance of Plug-Compatible Monsters

(Source: International Data Corporation, 1988)



*MIPS (millions of instructions per second) is a relative measure of performance based on vendor claims. Neither IDC nor the ***Gray Sheet*** tests the verity of performance statements.

Notes on this graph: All MIPS ratings are for hypothetical single-image job streams. The 280S from IBM and the 390E from Amdahl are both dyadic processors sold to be physically partitioned. Total MIPS for these systems when physically partitioned would be 41MIPS and 44MIPS respectively.
Graph depicts pricing activity as of August 12, 1988.

ful general-purpose processors available. The 3090 600S, claims IBM, will generate 56% greater throughput in a database environment than its predecessor E model.

Design enhancements responsible for the boost in database and similar commercial processing environments include about a 15% improvement in processor cycle times, an additional data path between CPU and main memory, double the buffer cache (to 128Kb), and up to twice the main memory (to 512MB on the 600S).

To improve performance in technical environments IBM altered the S model's floating-point multiply function and improved the vector facility. For numerically intensive computing applications IBM claims these moves will increase performance by as much as 40%.

However, the S family does not share equally in the advancements. The high end has been much more favorably treated than the low end.

For instance, the biggest 3090, the 600S, has received nearly a 35% boost versus the 600E, while the entry-point 3090 120S offers performance virtually identical to the 120E.

Price increases, not surprisingly, are also tilted towards the high end. The 600S, at $12.6 million, is 14% more expensive than the 600E. On the other hand, the 120S, at just over $1 million, costs the same as the 120E.

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3090 S Models Specs and Stats

(Source: IBM, International Data Corporation, 1988)

	120S	150S	170S	180S	200S	280S	300S	400S	500S	600S
Base Price ($M)	1.04	1.70	2.15	2.90	4.99	5.49	6.79	9.67	11.07	12.57
MB mem x channels	32x16	32x16	32x16	32x16	64x32	64x32	64x32	128x64	128x64	128x64
CPUs	1	1	1	1	2	2	3	4	5	6
Estimated MIPS	7.4	11.5	14.4	20.5	39.8	41.0	55.6	72.2	87.8	102.0
Delivery	9/88	9/88	12/88	12/88	12/88	12/88	12/88	12/88	12/88	12/88
Exp. storage (max MB)	256	256	256	256	1,024	512	1,024	2,048	2,048	2,048
Main mem (min/max)	32/64	32/64	32/64	32/128	64/256	64/256	64/256	128/512	128/512	128/512
Memory chip size	1Mb	1Mb	1Mb	1Mb	1Mb	1Mb	1Mb	1Mb	1Mb	1Mb
Channels (min/max)	16/32	16/32	16/32	16/32	32/64	32/64	32/64	64/128	64/128	64/128
Vector facilities	1	1	1	1	2	2	3	4	5	6

Looked at another way, whereas the E models offered a tenfold growth in performance from low to high end for a tenfold growth in price, the S models offer a fifteenfold growth in performance for only a slightly larger price range.

Stretching the performance range left a gap just above the 120S level. A new processor, the 3090 170S, was introduced to fill it. It runs at approximately 14.5MIPS and costs around $2.1 million.

IBM: More Is Yet to Come!

As annoying as the current state of affairs may be to Amdahl and NAS, it could be worse. So long as the 3090 provides the hardware foundation for IBM's large-scale systems strategy, the PCMs should be able to mirror IBM's moves.

And IBM insists that there is yet more life in the 3090 family. Of course, Armonk could be blowing smoke at Summit expectations to make the 3090s seem attractive for a longer term, but there appears to be ample evidence that more 3090 activity is indeed likely.

Thanks to the information and knowledge supplied by IDC Financial Services Corp's. chief IBM watcher, Frank Gens, the ***Gray Sheet*** has been able to piece together a quick overview of the next two to three years of IBM's large-scale systems strategy.

First, expect at least one, and perhaps two, 3090 price/performance kickers before Summit. That would boil down to on average about a 20% p/p per annum improvement prior to a late 1990/early 1991 Summit introduction.

Similar to this announcement, the kickers will take the form of performance enhancements, as opposed to pure price cuts. The first, the "G-series" (for lack of a better term), should be upon us by the fall of 1989.

Second, one rationale for delaying Summit is that IBM could work to transition its mainframe customers gradually to the next hardware generation by incrementally introducing "Summitlike" features on successive 3090 kickers.

For instance, using PR/SM (Processor Resource/System Manager) 3090 customers can employ a combination of hardware and microcode to logically partition processor facilities into independently configured machines.

One of the commonly mentioned characteristics expected of Summit is the dedication of

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Surveying the Competitive Terrain

IBM now has three powerful weapons against Amdahl: (1) the fifteenfold growth range in performance within the S family; (2) the tremendous upgrade flexibility across the whole 3090 spectrum; and (3) lest we forget, ESA.

NAS is in even worse position. It has to scramble to address not only each of these points, but also the capability provided by both IBM and Amdahl to logically partition hardware resources into separate processing domains.

Of the two PCMs, only Amdahl has reacted thus far to the S announcements. A week after IBM's play, Amdahl chopped the price of various 5890 and 5990 processors by 10-14%. Upgrade prices too were cut by between 12-17%. These moves reestablished the historic p/p differentials between Amdahl and IBM mainframes of between 15-20%.

Amdahl also noted that in spite of the fact that the 3090 600S and the 5990 1400 offer almost identical performance, the processor in the Amdahl machine has a faster cycle time: 10ns versus the 600S's 15ns.

Slightly better p/p and faster cycle times are small consolation to Amdahl in the face of a major architectural transition. As noted in the *Gray Sheet* (24:1, May 18, 1988), Amdahl's newer 5990s require a complete box swap, a more difficult and time consuming process than a 24-hour (maximum, according to IBM) 3090 field upgrade.

More important, IBM is calling the shots on ESA. The good news for Amdahl is that, now that the base code of MVS/ESA is available, the company can evaluate the challenge and adjust its sales and marketing messages accordingly. Look for a mid-September announcement from Amdahl as to the scope and timing of its ESA support.

The bad news is that at that time Amdahl will probably tell us engineering MVS/ESA support will require a solid year of development effort.

In the near term, then, Amdahl's competitive options are somewhat limited. Other than further pricing actions and additional name calling, about the only open avenue is to begin introducing more 5990s to counter IBM's S model growth path.

The *Gray Sheet* believes this is not what Amdahl wanted to do. Fujitsu can supply Amdahl with seven more "Hawk" models (from which the 5990s are derived), but each new 5990 announcement makes the older 5890s less attractive. IBM's aggressiveness with the S models may have made a gradual, controlled rollout of 5990s impossible.

As for NAS, word is beginning to circulate that its XL machines will receive a medium kick in performance (15-20%), coupled with a small price cut, in the next 30-60 days. But it is important to note that, unlike Amdahl's 5990, NAS will kicker existing processors and not introduce a new family.

hardware resources to separate system functions, such as network and database. One could imagine that with PR/SM this division of labor could be simulated.

Third, to avoid "brick walls," these features, when introduced, may be made available on new and most recent families, but not older. For instance, if fiber-optic channels are introduced on the Gs in late 1989, they will probably also be supported on the current Ss, but not the Es.

IBM could use this strategy to prod 3090 customers from one family to the next, increasing the upgrade options with each new introduction.

As a general rule, expect IBM to support new functions on older 3090s when the changes involve microcode upgrades. However, new circuitry designs will probably not be retrofitted.

Another for-instance: the missing 4MB DRAM chips the *Gray Sheet* expected to see on the Ss. When they are finally introduced, they will probably not find their way into E machines.

Finally, it is unlikely that we will see an eight-way 3090. IBM apparently will stick to a high-end design point of six processors, but tweak them separately and in tandem to deliver high-end 3090 performance of around 150MIPS by Summit.

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UNISYS LOOKS TO GOBBLE CONVERGENT. In a move allegedly to ensure continued supply of low-end Unix systems, Unisys has reached an agreement in principle with Convergent to acquire the workstation company's assets for $332 million, or $7 a share. Unisys expects 45% of the transaction will be cash, 55% will be Unisys common stock.

The move appears to make sense for both companies. Once a darling of the financial community, Convergent has lost some of its luster in the past few years. As a part of Unisys, Convergent will be able to retain much of its own identity. It will, for instance, be encouraged to continue to supply its CTOS/BTOS- and Unix-based workstations to long-standing OEM and VAR customers. Convergent Chairman Ely will assume a significant share of responsibility for Unisys's worldwide desktop strategy.

Unisys, on the other hand, has recently accounted for approximately 20% of Convergent's business. The move formalizes what had in fact already been a tight business relationship.

DECWINDOWS OPEN. A criterion for responding to the Open Software Foundation's request for end-user interface technology is that the technology must be available. Accordingly, Digital has commenced with licensing DECwindows, its heralded X.11-based network graphical end-user interface system. To make its technology more palatable to the market, DEC called the product XUI, for X User Interface.

Other than OSF, the announcement is most pointedly directed at independent software developers. Digital would like to see at least a large number of developers begin using the DECwindows toolkit as soon as possible, even if it won't have a mass of applications available anytime soon.

The reason is simple: OSF's response hangs in the balance. Other firms have until September 16 of this year to submit technologies, and the *Gray Sheet* expects Hewlett-Packard (New Wave) and suspects AT&T (Open Look) will be among those joining Digital in contention. If Digital can claim wide grassroots support for its XUI, then when OSF members meet to review the proposal in early November, Digital will be in a better position to influence the decision. It's still to early to speculate what that decision will be, but DEC and AT&T are currently the two favorites.

IBM UNFOLDS PRICE UMBRELLA. As part of a "normal business review" IBM United States bumped most product and program prices 5% and Maintenance Agreement charges 3%. Excluded from the action are all 3090 models, the 3990 controller, and all products announced since April 1, including the AS/400, and recently announced PS/2s and RTs. Product purchase price and service increases are effective immediately; one-time charges for program product will be hiked September 1; all else affected is slated to be marked up November 1.

What IBM probably reviewed was a bit too much price competition industrywide, but especially in the minicomputer arena. Accordingly, Armonk appears to be asserting its oligopolistic self. Early respondents indicate that they are only too happy to follow.

HP REFOCUSES AT TOP. To better oversee the Hewlett-Packard's burgeoning computer-related businesses, CEO John Young adjusted his and COO Dean Morton's operating responsibilities. Morton attentions will be primarily dedicated to HP's three computer-business sectors: the Business Systems Sector (PCs, office, terminals, etc.), the Technical Systems Sector (workstations, sci/tech/eng systems, manufacturing, etc.), and the Systems Technology Sector (Precision products, ICs, etc.). Young will take responsibility for Measurement Systems and most corporate administration functions.

GRAY SHEET PHONE NUMBER CHANGE. Massachusetts may not be in the throes of a miracle, but it sure is growing lickety-split. So fast, in fact, that Ma Bell has determined another area code for the Route 128/I-495 area is necessary. So please note the *Gray Sheet's* new number: 508-872-8200. The editor is at extension 216.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR JULY 22, 1988 • VOL. 24, NO.4 PATRICK J. MCGOVERN, PUBLISHER

Finally, DEC Gets Serious About OLTP

Digital has apparently reached a working consensus on what follows networking, and how to provide it. After a number of online transaction processing (OLTP or TP) false starts, DECtp could be Maynard's first unified step towards competing in the 1990s and beyond.

From a product standpoint, DECtp is only a small hop. In spite of DEC's performance boasts, the software programs and high-end DASD comprising DECtp conjoined with previously introduced families of symmetric multiprocessors give Maynard a competitive, but not mind-blowing, OLTP product set.

From a long-term positioning standpoint, however, DECtp represents a gold-medal leap. Previous forays into OLTP marketing have been piecemeal, scattered, unfocused — most unDEC-like — and have justifiably been met with skepticism.

DECtp, in marked contrast, appears planned, organized, purposeful — in a word, strategic.

If DECtp is any indication, Digital has admirably appraised its competitive position, made necessary adjustments to its market perspective, and implemented what could be a most effective plan for action. Consider the following:

- Without improvements to its basic software subsystems, any hardware betterment would be moot. Accordingly, the core of DECtp is enhanced software technology.

- DECtp also includes a blueprint for future product development activities and introductions: the Digital Distributed Transaction Architecture (DDTA). (And note: in Digital's engineering culture, architecture is not a word to be used lightly.)

- To force the OLTP issue internally, DEC has established an OLTP organization at headquarters.

- DEC's OLTP message fits nicely with the company's current strengths: integration of office, batch, decision support, and now TP applications in the same distributed information system. DECtp involves no radical departures.

- Digital's decision to integrate OLTP into existing system capabilities, and its architectural approach to development, should provide the company's all-important third-party software developers stable footing and a roadmap during this period of change.

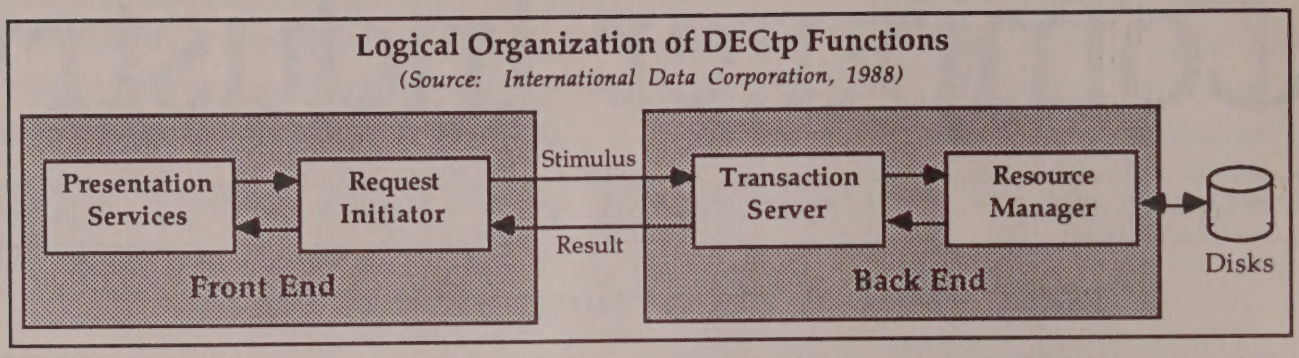
All this adds up to potential. But the reality of the current situation warrants explicit statement: DECtp does not make Digital an instant success in the OLTP market. The company will continue to lose business, especially coveted major account high-end business, to better positioned competitors.

For the near term anyway, Digital's strategic resolve will be sorely tested. How admirably it behaves in the face of this pressure will do more to determine its ultimate TP success than admirably laid plans.

What Digital Has Now: Technology

DECtp is essentially very sound technology, albeit not unique. Other vendors have, or are planning to provide, similar capabilities. Digital's implementation, however, is notable due to its basic simplicity.

DECtp logically breaks OLTP into a front-end component and a back-end component. The front end provides presentation services and acts as a "Request Initiator." The back end operates as "Transaction Server" and "Resource Manager."



Presentation services in this sense are more limited than the type promised by either IBM's Presentation Manager or Digital's own DECwindows. Insofar as DECtp is concerned, presentation services is synonymous with forms management (e.g., order forms presented on the screen).

Whereas the presentation services manage interaction with the end user, in DECtp the Request Initiator (RI) manages interaction with the system.

The RI manages character I/O, validates data entered into forms, and handles error routines/messages. From valid information input by the user, the RI constructs a DECnet Packet which, when sent, acts as a stimulus to the back end. Conversely, it disassembles results from the back end into a form suitable for presentation.

In the back end, the Transaction Server (TS) monitors and queues request stimuli, authorizes access to application resources, and controls the flow of work performed during transactions.

In the DECtp scheme, the TS performs one other function critical to OLTP applications: it manages machine failovers when catastrophic machine failures occur (assuming, of course, that alternate machine resources are defined to the TS).

Thus, machine fault tolerance (whereby tightly coupled CPUs constitute a single machine) is provided in software.

The TS, according to an application's work flow, calls the Resource Manager (RM) to access any type of object used in a transaction, including records, files, or journals. The RM can be a database manager, such as Rdb/VMS, or VAX/VMS's native file manager, RMS.

By partitioning the DECtp environment into logically discreet modules, Digital enables OLTP customers to allocate processing power in a cost-effective manner.

For certain application environments, all work might best be performed on a single processor attached to dumb terminals. In others, function might best be split among different classes of machines. One example could be PCs for presentation, MicroVAXs for RI, and a large VAXCluster at the rear.

An inherent danger of any modularly designed system is the promulgation of redundant and inconsistent data definitions, or data about data.

DECtp's central repository concept nearly obviates this problem. Most of the software subsystems in DECtp rely on a central hub — called the Common Data Dictionary Plus (CDD+) — for information about data structures, user views of data, security lists, and forms.

To ensure this strategy does not become a performance bottleneck at runtime, Digital added an important capability to CDD+. OLTP users can today distribute pieces of the dictionary across nodes as warranted by the distribution of processing function.

What Digital Has Now: Two Markets

Subsets of the DECtp product suite are suita-

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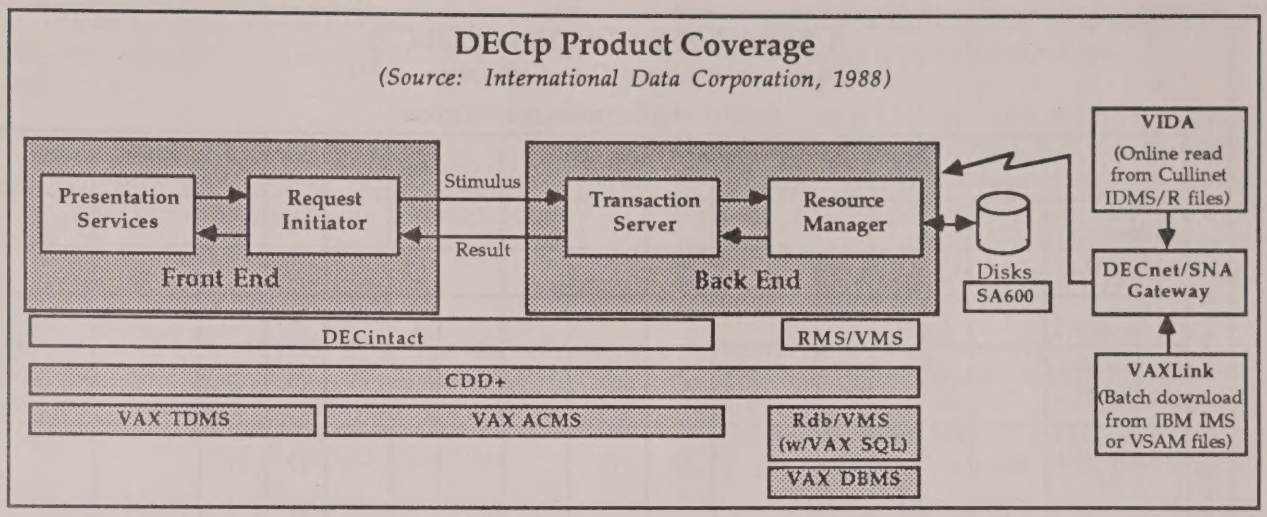

ble for two different OLTP application development and runtime environments. Roughly speaking, they could be labeled server/requester and queue based.

The server/requester environment is built to service a multitude of user profiles, application needs, and processing modes. In addition to availability and performance, flexibility, evolvability (the ease with which business changes can be reflected in the system), and ease-of-use are requisite capabilities. In the main, Digital's customers are here.

However, until DECtp they were primarily employing third-party software or, worse from DEC's vantage point, hardware from OLTP specialty vendors to satisfy their transaction processing needs.

To better compete in this environment, DECtp includes performance enhancements to the spokes sticking out of the CDD+ hub — Rdb/VMS (relational database), VAX DBMS (CODASYL database), ACMS (transaction monitor), and TDMS (forms manager).

The enhancements take two forms: support of larger databases, and performance improvements.

Thanks to an incremental backup-to-tape feature, Rdb databases can today be up to 50GB in size, a monumental increase over the previous recommended volume of 2GB.

Insofar as performance is concerned, Digital estimates that Rdb now operates two to ten times faster, depending on the type of processing in question.

The results of Digital's benchmarking efforts lend credibility to this claim. In an ersatz OLTP environment (Debit/Credit, no active dictionary), Digital's server/requester products performed well across a range of VAX hardware, according to results published by DEC.

But probably not well enough to strike a blow in the realm where might, as measured in throughput, makes right.

Here, IBM is king, and DB2/CICS its sword. To counter, DEC is offering DECintact, a transaction monitor it acquired from a small software house called ASCI. DECintact's strengths are primarily two.

First, CICS programmers will have an immediate affinity for DECintact's command-level programming rules. This point should not be underplayed. Access to the glass house is difficult enough without application developers blocking one's way.

Second, DECintact is designed for queue processing. In certain heavy-duty OLTP environments, such as found in many areas of banking, it is advantageous to explicitly define the transaction to the system as a queue of discreet tasks.

Then, in the event of bottleneck, queues, as op-

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A Snapshot Evaluation of DECtp

(Source: International Data Corporation, 1988)

DIGITAL PRODUCTS/IMPLEMENTATIONS

OLTP CAPABILITIES		VAX-Clusters	SMP	Uni/VMS	HSC	VAXsimPLUS (Volume Shadowing)	RA600	DECnet services	DDTA	CDD+	Rdb	DBMS	DEC-intact	ACMS	Data Distributor	VIDA/VAXLink
TPS	Native File (D/C)	—	O										O			
TPS	RDBMS (D/C)	—	O								O			O		
TPS	Diverse Transactions	?	?	?							?		?	?		
HIGH AVAIL	few/short planned stops	O	O		O		O	O		+	O	O	O	O		
HIGH AVAIL	minimum unplanned stops	O	—	—	O	O	O	O			—	—	O	O		
Evolvability		+							+	+	+	+	O	+		
Horizontal Scalability		+		O				+	+	+					O	
Vertical Scalability		—	O	—												
Security								O		O			O	O		
Multi-vendor data environ.								+	O	+	O	O				O
Standards			—	—				O	O	—	O	—	—	—		O

+ Competitive Advantage O Adequate — Competitive Disadvantage

How to read this chart: Primary OLTP attributes are listed to the left, selected DECtp components are listed across the top. Intersections between capabilities and products detail the ***Gray Sheet's*** opinion about a product's competitive position versus competing OLTP products. For instance, the ***Gray Sheet*** believes Rdb's performance per se affords neither an advantage nor disadvantage to Digital relative to other relational database programs sold into the OLTP arena.
Terms on left: TPS—transactions per second; D/C—Debit/Credit benchmark; Evolvability—ease of reflecting business changes in the system; horizontal scalability—ease of spreading OLTP function across peers; vertical scalability—room for growth.
Terms across top: HSC—hierarchical storage controller; RA600—DECtp high-end DASD; Data Distributor—a tool for physically replicating database views; VIDA/VAXLink—two tools to access data on IBM mainframes.

posed to requests for services, can be passed from one system to another. Moreover, recovery routines are simplified; the system need only restart the queue, eliminating the costly overhead of journaling each operation. Finally, queues and files can be hashed, upping performance considerably.

Digital's Debit/Credit benchmarks bear this out. DECintact, using RMS as Resource Manager, on similar processors performed between 24% and 155% better than Rdb/ACMS.

The downside of DECintact is that it is not fully integrated into the rest of DECtp. Although possible to do so, Rdb and DECintact were not paired in any of the published benchmarks. The ***Gray Sheet*** believes this is primarily because neither exploits the distinguishing features of the other. At this point, their mutual support is weak.

One final product requires mention. To better support high performance access to larger data volumes, DEC announced the SA600 high-end DASD. To achieve higher margins on SA600 sales, DEC vertically integrated disk production for the first (but not the last) time.

What Digital Needs

DEC's goal is to compete for top dog in the OLTP marketplace. Its objectives are three: use the CDD+ family to maintain existing account control; gradually penetrate new commercial business with same; and usurp major IBM account control with DECintact.

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The *Gray Sheet* believes Digital's DECintact objective will prove more elusive than its CDD+ objectives.

Before Digital can begin wrestling account dominance from IBM, it must address and successfully meet software and hardware engineering challenges.

On the software side, Digital has to fully integrate the DECtp subsystem and expand its distributed capabilities. The *Gray Sheet* does not believe this poses an insurmountable technical challenge to DEC's software engineers.

At least no more difficult than managing the project. Digital's plan is to construct a sysgen selectable adjunct to the VMS kernal to provide services such as 2-phase commit, recovery, common journaling, and remote procedures (among others) to DECtp (and third-party programs written to the DDTA).

This task will require a great deal of coordination among many DEC software engineering groups, and much soothing of OLTP customers. But it's facilitated by Maynard's architectural and organizational commitment to DECtp. The *Gray Sheet* anticipates much of the work will be done within three years.

DECtp's toughest obstacles may be hardware related. The VAX is not the optimal platform for high-performance OLTP, given its interactive and time sharing processing origins.

DEC has two major hardware challenges. The first is a return to the high-performance VAX-Cluster dilemma. The failover capabilities of DECintact and an enhanced ACMS improves VAXCluster availability.

It is interesting to note, however, that Digital published only one small VAXCluster benchmarking result: two loosely coupled 8810s running DECintact and RMS flat files. No results were given for VAXClusters in a server/requester environment.

Probably because you don't gain much performance over one machine. Currently there is no mechanism for syncronizing Rdb/VMS across a cluster; each node can only run local tasks against its own separate copy of the database.

The second is a return to the superVAX dilemma — the long awaited high-end uniprocessor. Perhaps as an indication that strategic decisions are being made, Maynard not too long ago cancelled Argonaut, one of the high-end projects Digital has been pursuing (see the *Gray Sheet*, 23: 22-23, April 7, 1988).

The *Gray Sheet* believes a couple of others are waiting in the wings, one air-cooled (Aridus) and one water-cooled (Aquarius, get it?). Both could be based on Motorola's new MCA III next generation ECL technology. When introduced, they should provide DEC a 15-23MIPS uniprocessor performance range.

That should yet be a wait. Aridus is not expected until the first half of next year, Aquarius not until late 1989/early 1990. Until then, DECtp will probably not become a major alternative in the high-end OLTP market.

One other high-end hurdle facing Digital is the OLTP learning curve. DEC's sales and service organizations have much knowledge to acquire before the company is ready to put an OLTP hurt on IBM. Digital, fortunately, is well aware of this and has in place a number of mechanisms for training the field.

DECtp: The New Commitment

But what Digital currently lacks in product, it makes up for with resolve. And that's important. Because the greatest danger facing Digital may stem not from competitors, but from the chance that in haste it may undermine its own single architecture strategy.

Over the next three-to-five years, Digital will incrementally implement DECtp components.

DECtp is a catalyst. Maynard is marshaling its forces for a major unified assault on the high-end. It believes it has drawn Excalibur from the rock, in the form of a flexible, distributable transaction processing alternative.

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The DRAM Jam

(Note to our readers: The following analysis is the first fruit of IDC's relationship with In-Stat. The Gray Sheet thanks the analysts at In-Stat for their invaluable input.)

Recently, the *Gray Sheet* found itself in a retail computer store not visited since late January. During the earlier visit, the price of nine 256Kb MOS memory devices, in the same neat packaging as would contain corn-cob holders, was noted: around $40.

Today, that same bundle of silicon costs over $135. Needless to say, the *Gray Sheet* decided it had enough memory for the time being, and passed on the puchase.

Systems vendors don't enjoy similar discretion. The scarcity of cheap 256Kb and 1Mb dynamic random access memory (DRAM) devices is severe enough to impact the competitive status quo in most systems and many peripherals markets.

At work is the age-old problem of demand exceeding supply. Most often the U.S.-Japanese Semiconductor Trade Agreement is cited as the primary culprit, but there are two equally if not more important forces at work.

The first of these is the generational transition from the production of 256Kb components to 1Mb components.

Because the larger chips will be more efficient, ergo profitable, to produce, memory manufacturers have initiated a changeover in capacity mix.

There is, however, a learning curve which must be scaled. Probe yields are only recently high enough to justify a full-blown ramp of 1Mb capacity.

The exit of 256Kb capacity, and the low ramp of 1Mb capacity, has created a short-term bind in both markets.

A second major contributor to the shortage is the overall increase in the amount of memory required by systems to efficiently operate.

For instance, DOS-based PCs generally called for a single megabyte of memory. To run OS/2, however, a minimum of 2MB is required; probably 4MB if one desires to do more than play with the OS/2 interface.

This phenomenon is not limited to personal computers. Workstations, minicomputers, even mainframes are all incorporating new functions which eat semiconductor memory. A few more instances:

- In the workstation market, Sun Microsystems reportedly consumes as much as 78,000 one-megabit chips a day.

- In the larger-systems market, both Digital and IBM are using memory to favorably position their products. Digital touts the 8800 series on the basis of, among other things, its support of up to 512MB of real memory. IBM is aggressively marketing the potential benefits to 3090E users of expanded storage.

Exacerbating the situation is the tendency to buy extra memory at system purchase time, especially at the low end.

In-Stat observes that during the memory crunch, selling one 386PC configured with 4MB instead of the basic 1MB could preclude three other basic 386PC sales. Since margins are not made on the sale of add-in memory but new systems, that could affect the bottom line.

The current dynamics have two overall effects. First, the average price of 1Mb components has zoomed on the spot market from $14 a few months ago to $32 presently, according to In-Stat.

To put these prices in perspective, consider the previous PC example: 2MB of memory equals 18 1Mb chips. OS/2 consumes nearly $600 worth of memory at today's prices.

Second, lead times for deliveries of memory parts have lengthened to 20 weeks — nearly five months, an eternity in many markets where product cycles are 12 to 18 months long.

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Lamming the DRAM Jam

The shortage is necessitating tactical adjustments on the part of almost all systems manufacturers. The particulars vary, but most fall into one or the other of the following catagories:

Monitoring the situation closely. Many OEMs have "sweetheart" deals with both semiconductor manufacturers and distributors that guarantee them access to parts — particularly 256Kb DRAMs — at reasonable prices.

However, as 256Kb prices become more dear, many of these relationships may sour. OEMs are thus in the process of weighing the need and economics of the newer 1Mb technology against the certainty of their existing supply channels.

A bird in the hand is worth two in the bush. Those OEMs equipped with adequate memory inventories are using shorter AROs to differentiate their offerings.

Pass the buck. Systems vendors have begun tagging surcharges to systems and add-in memory prices to reflect the short-term price escalation of DRAMs.

One reason for this type of action is intuitive: Vendors want to relax margin pressure.

The other reason is less so, and may in fact dominate: A gray market for memory is forming. Some distributors are buying add-in memory boards, stripping them of DRAMs, and selling the parts back to OEMs. Higher board prices should discourage this practice.

Roll your own. A few OEMs, notably IBM, have what appears to be plenty of captive capacity for memory production.

It is unlikely that IBM or anyone else will expand its semiconductor plant during the shortage, but will certainly increase the utilization of what exists, thereby obviating the vagaries of the spot market.

Damning the DRAM Jam

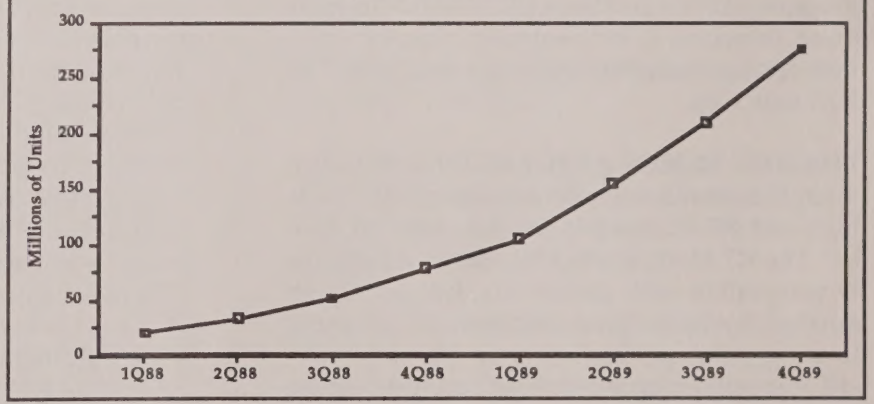
In-Stat anticipates total 1988 demand of 1Mb DRAMs will exceed 257 million units, far greater than a production run of 184 million units.

Likewise, 256Kb production will this year fall short of demand by a large margin. In-Stat figures indicate that next year should be even worse as more 256Kb capacity is shifted to 1Mb production. More and more systems vendors will be compelled to take the 1Mb plunge.

In 1989, however, the 1Mb situation should start to improve. According to In-Stat forecasts, an estimated 745 million 1Mb DRAMs should be produced next year, enough to satisfy a demand in the range of 650 to 750 million units.

As a result, 1Mb DRAM prices should fall to between $8-12 on the spot market by this time next year.

Forecasted Worldwide Production of 1Mb DRAMs during 1988/1989, by Quarter
(Source: In-Stat, 1988)



The major change in production will be greater yields. Today, In-Stat estimates the industry average total yields (which include assembly and test losses) to be in the range of 35% to 40%.

However, larger wafers, new fabs, and tighter geometries will all contribute to more efficient production runs.

And as soon as the system seems to work correctly, then it will be time to consider 4Mb chips.

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IBM ITEM #1: DOS 4.0, OS/2 1.1. There is yet much life in the Intel 8086/8088-based PC market. According to research conducted by IDC's Workstation Research Group, almost 4.2 million 8086/8088 units were shipped by U.S.-based vendors in 1987. To encourage the low end of the PC market, IBM and Microsoft have rolled out DOS 4.0.

Some of DOS 4.0's new features: a new graphical user shell that is easier to use than the existing DOS command syntax; integrated support for the Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS); hard disk partitions greater than 32MB; and inclusion in the IBMLink online support network. One thing that hasn't changed: good ol' DOS still costs only $95.

For $795 any of IBM's more ambitious Intel 80286/80386 customers can acquire OS/2 1.1, or extended edition. As the personal computer operating environment participating in SAA, it bundles the base OS/2 code with SQL database and QMF query facilities, a plethora of terminal emulation types, and Advanced Program-to-Program (APPC) and Server Requester Programming Interface (SRPI) support. Finally, IBMLink services have been extended to support OS/2 1.1 user sites.

IBM ITEM #2: NEW RT PC MODELS. IBM's Personal Systems Group also announced three new high-end RT PC models for the technical market. The RT Models 130, 135, B35 are functionally compatible with earlier RTs, but are distinguished by faster processor speeds, enhanced floating point performance, and a more cost-efficient option for increasing fixed-disk storage space.

If you want an RT, you still pay for the IBM name; but not like before. IBM claims the RT can deliver .78 MFLOPS and 5.6 RISC MIPS — both reasonably competitive figures in the <$40K workstation market.

IBM ITEM #3: IBM IN PUBLIC WITH X/OPEN. After months of flirting, IBM and X/Open are an official item. Publicly, X/Open officials are professionally pleased with IBM's sponsorship; privately in conversations with the ***Gray Sheet*** they sounded tickled.

Because X/Open members are bound to at some point provide product based upon the organization's Common Application Environment (CAE), IBM's X/Open pursuit may institutionalize the Unix/SAA schism.

Note: Rumors abound that the Open Software Foundation may be preparing to join X/Open as well. Why not? There's plenty of standards setting fun to go around for everyone.

JUST HOW FAST IS ORACLE TPS? As part of its version 6.0-Transaction Processing Subsystem (TPS) announcement, Oracle chartered the Concorde and treated the ***Gray Sheet*** and others to a Mach 2 flight 60,000 feet above the Atlantic.

Bloody impressive — the Concorde that is. Oracle V6.0-TPS also reflects good work, but is perhaps better compared with the Boeing 767's position in the airline industry: technically sound, fast enough relative to the competition, and the newest product from the industry's sales leader.

To better compete against Sybase's SQL Server, RTI's enhancements to Ingres, and Digital's work on Rdb, Oracle claims 50% of the code was rewritten to make it operate more efficiently. This had been the biggest knock against Oracle's DBMS.

Not once did the ***Gray Sheet*** hear Oracle refer to any of its primary midscale DBMS competitors by name. The only vendor so honored was a mainframer: IBM. Oracle, like Cullinet a few years back, seems obsessed with the notion that DB2 is vulnerable, and committed to proving it. Perhaps when you're doubling income annually, these little indulgences can be excused.

The only real downside of the announcement was the small controversy surrounding Oracle's benchmarking methods and results. Apparently, Oracle was forced to shop around for someone to approve the company's benchmarks. The actual results sounded impressive (e.g., 265 "Banking" tps on an Amdahl 5890-600E with MVS/XA), but until benchmarking cute stuff is cut out, we may never know what that really means.

A LITTLE SUIT AMONG FRIENDS III. HP has invoked the Sherman Anti-Trust Law in a countersuit against Apple. More on this forthcoming in future ***Gray Sheets***.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR JULY 8, 1988 • VOL. 24, NO. 3 PATRICK J. MCGOVERN, PUBLISHER

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IBM Wholeheartedly Dives into Silverlake

The announcement of the AS/400 — the System 3X follow-on colloquially known as "Silverlake" — is anything but a surprise. A veritable river of information has been leaking out of Silverlake, irrigating a small industry devoted to S/3X speculation.

What is notable, especially after the 9370 debacle, is that IBM done good — very good. There is little doubt that the AS/400 is the best midrange product IBM has announced in years. It could give Armonk not only a sensible competitive position in the big-money and strategically critical midrange market, but an advantageous one.

One key is technology. The other is an understanding of and a commitment to the AS/400's target market.

By making clever use of the AS/400's object-oriented architecture, Armonk is attempting to build the midrange computer industry's most aggressive marketing, distribution, and support systems. If Big Blue is successful, the parameters of midrange competition may well be fundamentally altered.

IBM's ambitions are greatly facilitated by the fact that there are nearly 225,000 (not including S/36 PC users) qualified prospects for the AS/400 worldwide. The loyal S/3X installed base is a ready-made testing ground for IBM's emerging strategies.

Still, the effort won't be without challenge. One large obstacle could be IBM's own S/370 bias. To mitigate internal competition, the AS/400 will initially be targeted at small businesses and decentralized departments of large corporations, two potentially big markets not well suited for IBM's S/370 family.

And, of course, there are external competitors to contend with. The AS/400 is impressive, but hardly perfect. It won't kill any VAXs, or halt Unix boxes from proliferating, but it may stun them. Consider some pluses, minuses, and so-so's relative to the market:

- Plus. Migration from older S/3Xs to the AS/400 appears manageable. Little opportunity for the competition here.
- Plus. The AS/400's programmer productivity, context-sensitive online help, and simplified operations may be the best in the midrange. Leading cost of ownership.
- Plus. Integrated national language support.
- Plus. Proven packaged software applications are plentiful.
- Plus. Flexible packaging of hardware and software, simple (and aggressive) pricing schedules, and leasing options make the machine "customer friendly."
- So-so. The family's breadth of performance across six models isn't nearly as wide as Digital's VAX, merely adequate.
- So-so. SAA support is always forthcoming.
- Minus. No floating-point processor.
- Minus. No Ethernet means little chance that the AS/400 could easily function in a multivendor environment.

A Closer Look at IBM's Objet d'Art

The AS/400 is in many respects an enhanced, price-competitive System 38 incorporating many of the ease-of-use characteristics found in the System 36.

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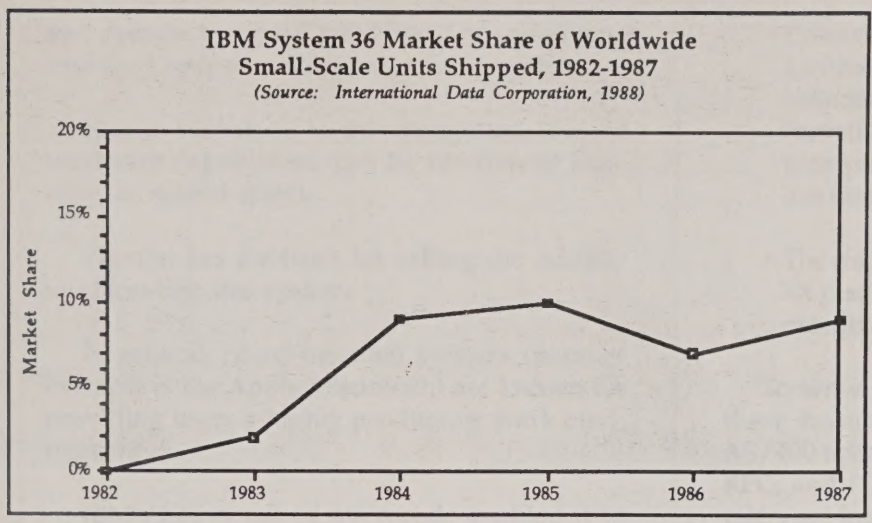


IBM's Objet d'Art: Hardware

At the hardware level, the 16 base registers used in the AS/400 are each 48 bits in size, creating a 280-terabyte virtual address space. Data is written to and read from main storage across an 80-bit-wide data bus.

Control in the central processor is handled by four separate functional units. Two handle main storage (error checking and correction, I/O interface, main memory refresh, etc.). A third fetches control words (conditional branching, interrupts, etc.). The fourth manages virtual address translations.

The I/O subsystem is very similar to the one used by the 9370. External I/O takes place over a 36-bit-wide multiplexed data bus (32 data bits and 4 parity bits) at about 5.4MBps.

Like the S/36, much of the I/O processing has been offloaded from the CPU to intelligent controllers. Standard Motorola 68000 and Intel 80286 chips are being used to build these controllers.

To make full use of processing power available to the external bus, work on it can be initiated by either the system processor or the I/O controllers and completed synchronously.

Two features commonly found in midrange machines, yet missing from the AS/400 are a floating-point processor and cache.

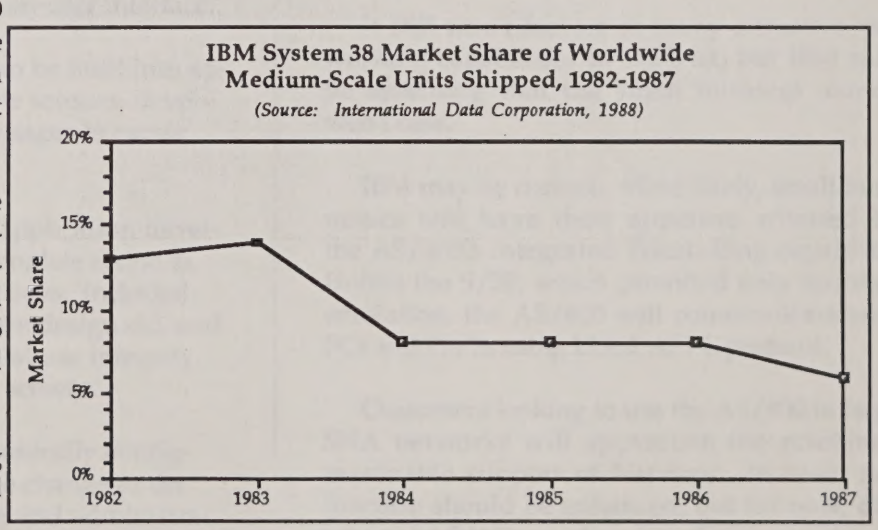
The *Gray Sheet* does not soon anticipate IBM to incorporate a floating-point unit into the AS/400 CPU. For the foreseeable future, AS/400 customers must trade off raw number-crunching performance with the machine's other strengths.

On the other hand, memory caching will almost certainly be delivered within the next two years.

Objet d'Art: Firmware and Software

Extensive microprogramming creates a high-level machine interface which separates programmers, administrators, and end users from basic machine functions.

The actual physical drudgery that takes place within the system (e.g., storage management, physical database management, security



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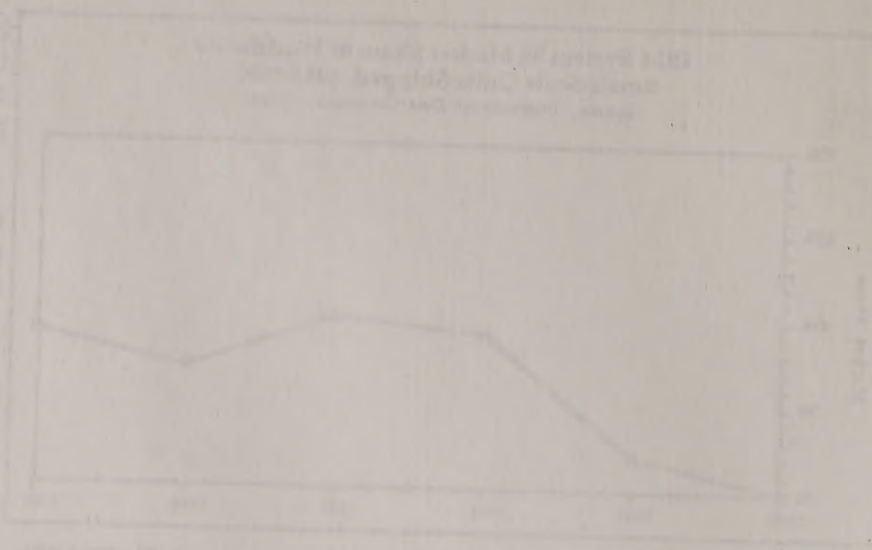

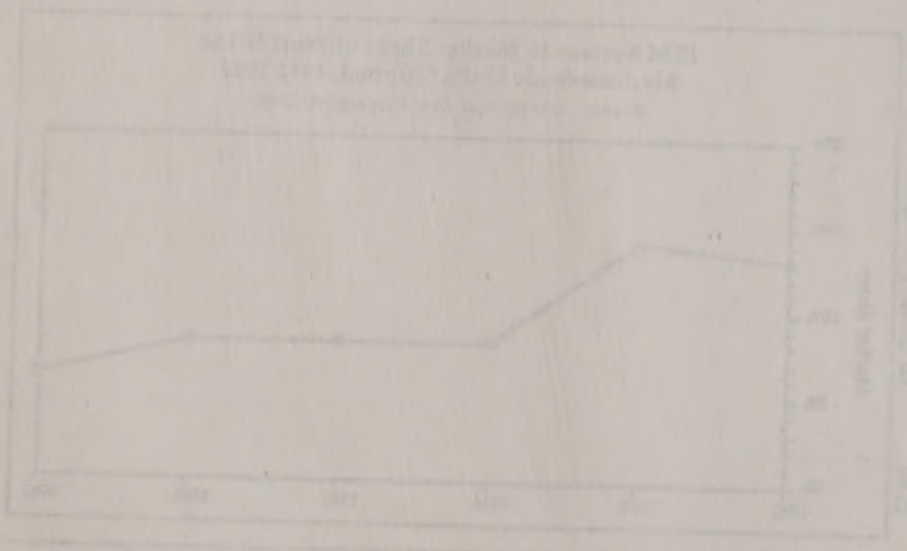

and system integrity tasks, etc.) is completely managed by the machine's operating system.

System resources, be they programs, files, or hardware capabilities, can be referenced logically, as named objects.

Therein lies the basis for calling the AS/400 an object-oriented system.

In general, object-oriented systems (another example is the Apple Macintosh) are known for providing users a highly productive work environment.

IBM's heavy use of microcode enabled it to integrate a number of useful subsystems directly into the AS/400's operating program — cleverly called OS/400 — without making major performance sacrifices. For instance:

- OS/400 integrates a relational database. The database can be created, mapped, and manipulated by data languages used in the S/36 and S/38 worlds, as well as SAA's relational data language, SQL.

- Since resources are referenced as named objects, the user interface is menu driven. Fast path commands are provided for users with more system proficiency. According to IBM, the interface's semantics and syntax conform to the dialog manager specifications of the SAA common-user interface.

- Context-sensitive help can be built into applications. As they define screens, developers can attach help messages to curser positions.

- A comprehensive set of application development tools provides complete access to all operating system functions. Included are a source editor, a screen design aid, and a utility for mapping database integrity constraints to data-entry screens.

- New devices can be dynamically configured without defining the change to the system. System planning and administration are greatly simplified.

- Powerful problem analysis and correction facilities are another benefit. The system collects and tracks data about resource performance. It has the intelligence to recognize and report not only impending failure, but intermittent problems as well.

- The migration of user skills from older S/3X platforms is assisted by S/36 and S/38 execution environments built into OS/400.

To write programs which take advantage of these features, IBM has delivered three new AS/400-specific compilers, one for Cobol '85, RPG, and PL/1. Both the Cobol and RPG compilers are functional extensions of those found on the S/36 and S/38.

Other SAA programming languages, like C and CSP (IBM's chosen 4GL), are not yet supported. It will be more than 18 months before IBM details a delivery schedule for these programs.

Objet d'Art: Networking

Most of the AS/400's networking capabilities won't be available until November 25 of this year. However, when they are delivered, the AS/400 will be IBM's best peer-to-peer processor (in large part because the S/36s were the proving ground for APPN).

It still won't feature as many attractive networking capabilities as DECnet, but IBM may be assuming that the small business market won't care.

IBM may be correct. More likely, small businesses will have their appetites whetted by the AS/400's integrated Token-Ring capability. Unlike the S/38, which provided only terminal emulation, the AS/400 will communicate with PCs and PS/2s using LU6.2 APPC protocol.

Customers looking to use the AS/400 in large SNA networks will appreciate the machine's reasonable support of Netview. In time, this function should be enhanced, but for now, distributed AS/400s can be centrally managed.

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AS/400 Specs and Stats

(Source: International Data Corporation, 1988)

Model	B10	B20	B30	B40	B50	B60
Enclosure Type	low office	low office	rack	rack	rack	rack
Processor Model	9404	9404	9406	9406	9406	9406
Technology	CMOS	CMOS	Bi Polar	Bi Polar	Bi Polar	Bi Polar
Speed	120ns	120ns	60ns	60ns	60ns	60ns
Main Memory (min/max Mb)	4-8	4-16	4-36	8-40	16-48	32-96
Memory Chip Size	1Mb	1Mb	1Mb	1Mb	1Mb	1Mb
Max DASD Capacity (Mb)	945	945	6,800	6,800	13,600	27,200
System I/O Bus	1	1	1	1	2	3
Max Card Slots	4	4	14	21	39	71
Max Communications Lines	8	8	16	32	32	32
Max IBM Token Ring Adaptors	1	1	2	2	2	2
Max Workstation Controllers	3	3	3	5	8	12
Typical Active Users	4-12	8-20	12-30	24-48	36-80	64-150
Relative Performance	1.0	1.3	1.5	2.3	3.5	5.5
System Unit Price	$19,000	$33,500	$26,500	$62,500	$133,500	$229,500

One interesting note: The AS/400 is the first of IBM's mainstream multiuser processors to offer native support for ASCII devices.

One major drawback: Ethernet is not supported. The *Gray Sheet* believes this is mainly a move to position the 9370 favorably, and not the result of a technical difficulty.

No doubt the market will start demanding Ethernet support on the AS/400. No doubt IBM will then deliver it.

The Low-End 9404s

IBM has two design points for packaging the AS/400's leading-edge technology. Two 9404 wide-tower units comprise the low end; four 9406 rack-mounted units handle the high end. All are air cooled.

The system packaging of the 9404 Models B10 and B20 is quite appropriate for the office or other quiet environment. The base system includes 630MB of DASD and a 120Mb 1/4" streaming tape drive, and is housed in a 25"-high wide-tower casing that requires six cubic feet of space.

A number of peripheral options are available. Among them are a 5.25" and an 8" diskette unit. Surprising to some, a 3.5" diskette unit (PS/2 compatible) was not offered.

The 9404-B10 offers performance equivalent to an S/36 5360-C (≈ 0.5 MIPS) at about 60% of the cost.

The High-End 9406s

The 9406 models B30, B40, B50, and B60 make up the high end of the AS/400 group. The performance requirements set for the 9406s and the need to operate in an air-cooled complex meant that IBM had to forsake CMOS technology. However, in the future the full AS/400 line could be CMOS, which would significantly lower the unit's power consumption and space requirements.

The 9406s are packaged in the same 9309 rackmount as the 9370. Incidentally, when it is announced in 12-18 months, the *Gray Sheet* anticipates that the 4381 follow-on will also come in this rack unit.

Six basic rack configurations provide the

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foundation for all four 9406s. Upgrading from one 9406 to another can be as simple as rolling in another rack unit and plugging an expansion card into a few I/O slots. The rack structure of the AS/400 requires 20% of the floor space of a similarly configured S/38.

Finally, the 9406-B60 delivers roughly twice the performance of the best performing S/38 at about the same cost.

Don't Dwell if It Won't Sell

The AS/400's system architecture, packaging, software applications, and connectivity combine to make Silverlake one of IBM's most impressive product introductions in any market, not just midrange.

Because it is easily differentiated from conventional midrange systems, one might have expected Big Blue to stay true to its heritage and attach a premium price to the system.

And yet, the AS/400 is the first midrange processor family from IBM that is not generally at a price/performance disadvantage relative to the competition.

Why? Because if IBM can make price/performance a competitive non-issue, it can bring the whole of its marketing might to bear on other areas.

(continued on page 7)

The High-End S/3X Opportunity

In 1987, IDC estimates that S/3X shipments accounted for $1.3 billion, or approximately 3% of the hardware shipment value to the U.S. computer market. By far and away, however, it was S/36 shipments — particularly the low-end 5363 — that generated the lion's share of the revenue.

The S/38 has been less competitive in the midrange market for quite some time (see graph on page 2). The machine's relatively low performance ceiling and uncertain future are two of the primary reasons for the S/38's sliding market share.

The last time IBM enhanced the S/38 was two years ago, when in June 1986 it announced the Model X00s.

In spite of the uncertainties surrounding the box, more than 31% of the S/38 faithful have upgraded to a model X00 since that time, according to IDC's processor datafile.

More striking is the figure, again from IDC's datafile, that nearly 32% of this group is at the top-of-the-line Model 700 level.

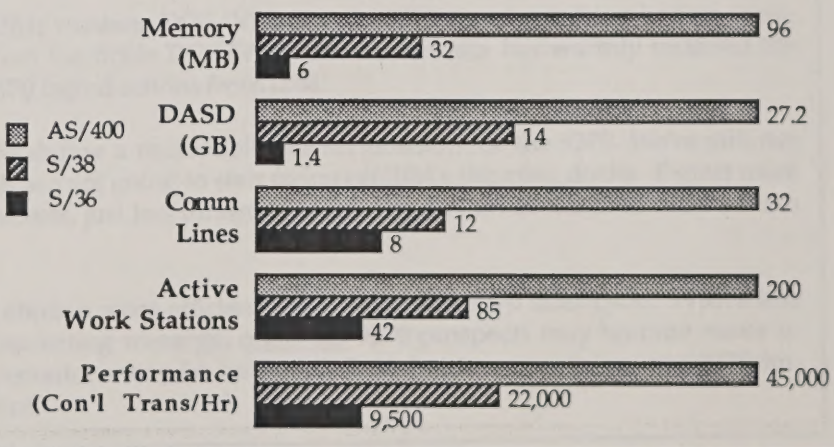
In other words, nearly 10% of the entire S/38 base has run out of upgrade room.

Because migration from the S/38 is relatively simple, more than 2,500 S/38 customers worldwide are immediate candidates for the high-end AS/400, the 9406 Model 60.

Given the B60's $229,000 base price (not including peripherals or software), its a matter of simple arithmetic — it could mean hundreds of millions of dollars in revenue for IBM.

High-End S/3X Capacities by Generation

(Source: International Data Corporation, 1988)



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Effect on the 9370

Now that IBM's sales force has another midrange toy to play with, the natural inclination is to further discount the value of the 9370, both to IBM and its customers.

However, after discussing the fortunes of IBM's beleaguered low-end 370 machine with IDC analysts, the *Gray Sheet* believes the 9370's prospects may, in fact, be (slightly) improved by the arrival of the AS/400.

That is not to say that the 9370 should once again be viewed as a "VAX killer." Far from it. The box still lacks applications software and subsystems for simplified operation and administration. The 9370 is no more suitable for the office or small businesses today than it was prior to June 21.

What has changed, however, is that IBM's marketing minions will no longer try to force the 9370 down departmental or small business throats. The AS/400 should be much easier to swallow in those environments.

Leaving the 9370 free to play for business for which it is better suited. Three areas come to mind:

- As a replacement box for the 4361s running DOS/VSE.
- As a vehicle for distributing customer-written MVS and VM S/370 applications (although many of the communications and other software subsystems for centralized administration are as yet not available).
- As an AIX/Ethernet-based computer for multi-user scientific/technical applications.

It is still too early to tell whether or not the 9370 will be widely employed for spreading mainframe applications around organizations. That requires customers to make system-architecture decisions, which typically take two or more years. Early returns compiled by IDC, however, indicate that IBM's mainframe customers are generally not preparing to use distributed midrange computers to satisfy processing requirements traditionally associated with large systems.

The *Gray Sheet* doesn't expect the 9370 to supply IBM with anything more than petty cash from the sci/tech/eng market. Of course, petty cash for IBM is a good year for some, but another effort will be required for IBM to make an IBM-type splash in laboratories.

It is as a replacement box for 4361s running DOS/VSE that the 9370 appears to have had its greatest success. IDC statistics show that the fickle DOS/VSE user community has warmly received the 9370 relative to other midscale S/370 introductions from IBM.

All told, the AS/400's strengths define a reasonable market position for the 9370. We're still not talking huge numbers here — 9370s are not going to start flying off IBM's shipping docks. Expect more of the same in terms of shipment success, just less thrashing around by an IBM in search of customers to ship them to.

In other words, we are talking about a more efficient and manageable 9370 sales cycle. With a less distorted, and easier to believe, marketing message, qualified 9370 prospects may become easier to find, target, and sell. Others' expectations may be further dashed, but in our opinion, any 9370 improvement is a notable improvement.

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Ironically, the *Gray Sheet* believes IBM's central theme will be the same DEC has been using to bash IBM's S/370 products: cost of ownership.

Five variations will be played to the market: growth, productivity, simplicity, support, and solutions. IBM will use different technological and marketing instruments to promote each.

IBM has promised a tenfold performance range from entry point to high end. Thus far it is only fivefold.

Technical enhancements for the AS/400 should start arriving on a six-month schedule. Within two years expect memory cache techniques and 4Mbit DRAM chips.

Big Blue says the AS/400 has no performance ceiling, but the *Gray Sheet* believes the real opportunity lies below. If IBM can deliver a $10K AS/400, thereby covering the immensely popular S/36 5363 (which is still being aggressively sold), the market could really open up for them.

The AS/400's productivity song could only get sweeter relative to the midrange as SAA actually arrives. That is a five-to-ten-year process.

Against low-cost Unix providers IBM will bang its simplicity drum. Unix systems (from both IBM and others) will be portrayed as offering many third-party options that require a great deal of customer integration.

IBM is marketing AS/400 Total System Packages (TSP) bundling preconfigured combinations of hardware, software, and maintenance services to customers unable or unwilling to undertake their own system integration.

IBM Credit Corp. is offering Total System Leases (TSL) as another mechanism for procuring AS/400s.

The IBM support offering starts with some of the functions integrated into OS/400. Context-sensitive help screens and problem determination and correction are the foundation for IBM's support network. Using these, the goal is to make each AS/400 customer self-sufficient.

Built into each AS/400 is a modem. If a user's help request can't be satisfied locally, the machine will automatically dial a central IBM support line to query the central help database.

Education is also online. For instance, 47 online education modules describing system operations are integrated into the AS/400.

All the technological and marketing functions are available to alternate channel partners and third-party application developers. IBM needs them to sell the machines to the small-business market efficiently.

Currently, IBM boasts 1,200 internally produced and third-party applications; it promises 3,000 by the end of August. The IBM Application Center in Rochester, MN, is handling new 12 parties a week.

VARs and software publishers will not blindly embrace IBM. Large partners that don't rely on it for the bulk of their business will be wary of any arrangement that ties them closer to Big Blue. This is particularly true if IBM markets a competitive application.

Will the Market Follow?

For IBM, and its competition, customers, and partners, the AS/400 means change. What remains to be seen is how well IBM can regulate its rate.

In the midrange certainly, it has been unable to as of late. But the AS/400 provides Big Blue with vastly greater competitive resources.

If IBM is successful, it is likely that many of the marketing, service, and support innovations introduced or sanctioned by the AS/400 could spread to other areas within IBM. The AS/400 could be our first glimpse of what IBM would look like in the year 2000.

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NO FAULT WITH STRATUS'S CHANNELS. It may be coincidence, but it does seem as though IBM's whole midrange strategy is coming into sharper focus as a result of Silverlake. On June 6, a couple of weeks prior to the AS/400 introduction, IBM and Stratus jointly announced a renewal and extension of their OEM agreement. The signing ended much speculation that IBM was preparing to deemphasize the System/88, which it gets from Stratus, to deliver a fault-tolerant processor of its own design as part of the Silverlake family. The IBM channel accounts for just over 20% of Stratus's business.

Indeed, the agreement was extended. IBM granted Stratus the worldwide right to sell IBM's System/88 Systems Network Architecture (S/88 SNA) communications product. S/88 SNA will allow Stratus's XA 2000 to fully participate in peer-to-peer application environments developed on LU6.2 protocols. One very important such environment is Netview, IBM's strategic network management software product.

Stratus also renewed its worldwide distribution agreement with Olivetti. Olivetti remarkets Stratus systems under its CPS label. Stratus indicated that Olivetti accounted for 11% of its 1987 sales.

IBM DOESN'T LAY OFF 3,000+. Apparently, IBM's U.S. revenue is not rising, nor costs falling, fast enough to suit Armonk, so once again the big blue machete sings. Lopped off are 3,000 to 4,000 positions over the next few years, and a sizable chunk of its disk (Tucson, AZ) and PC (Boca Raton, FL) manufacturing capacity. IBM indicated that the moves do not necessarily indicate weak demand for any specific products, but rather the desire to employ more efficient plant.

JOINING THE CLUB. Relational Technology, Inc., a leading DBMS vendor for the VAX and Unix environments, is the Open Software Foundation's first software member. Also, Fujitsu has become the first Japanese computer vendor to join X/Open.

FIRST 68030 WORKSTATIONS. Hewlett-Packard and Apollo finished one and two respectively in the race to announce Motorola 68030-based technical workstations. Both based their initial 030 products on the 25 MHz version.

On June 13, HP introduced the HP 9000 Model 360, a 4+MIPS machine which boasts impressive 3D graphics.

What impresses about Apollo's 030 entry is its time to market, price, and availability. In spite of some recent well-publicized difficulties, Apollo has once again demonstrated its R&D savvy by beating Sun to the 030 punch. Its "personal workstations," the 4+MIPS Series 3500, opens with a diskless, monochrome display version for less than $8,000. And customers won't have to wait for the 3500 as they are waiting for Apollo's PRISMs: Apollo assures the *Gray Sheet* orders will be filled 30 days ARO in spite of the DRAM shortage.

Both companies expect to be delivering 33MHz-based 030 workstations by the end of the year.

APOLLO'S DOLLAR DOWNERS. Speaking of Apollo and its PRISM workstations, perhaps there is a silver lining in the news that Apollo second quarter looks lousy. Its customers seem to be anxiously awaiting shipment day of its RISC box; at least that's one reason offered by the company to explain the precipitous drop in the bottom line.

Another reason given for its paltry 10% quarter-to-quarter revenue growth was trouble at the company's West German subsidiary. Apparently, an OEM agreement with Siemens is not moving product as expected. Apollo's manager in charge of the relationship has been replaced.

To add insult to injury, the company has had a class-action suit filed against it by an irate stockholder.

HAPPY BIRTHDAY INTEL. Twenty years ago this month, Mr. Noyce founded and incorporated Intel to commercialize one of recent history's littlest big ideas: the microprocessor. We have all been the beneficiaries.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR JUNE 10, 1988 • VOL. 24, NO. 2 PATRICK J. MCGOVERN, PUBLISHER

The OSF: Paladin or Parasite?

The announcement of the Open Software Foundation (OSF) has been met predominantly with skepticism. Some apparently feel that the OSF, like the ministries in Orwell's *1984*, will actually be used to attack, not further, the cause for which it was named.

There is historical justification for their incredulity. The OSF embodies a deeply rooted contrariety that no press event, no matter how well choreographed, can camouflage. As proposed, the purpose of the OSF is to cooperatively implement standards for building vendor-independent, Unix-based information systems. But the actual stances maintained by OSF's sponsors towards Unix appear to be so widely divergent as to leave little room for cooperation.

The proprietary interests of IBM and DEC in particular seem to stand in direct opposition to the more open-minded strategies of the OSF's other five sponsors — Apollo, Groupe Bull, Hewlett-Packard, Nixdorf, and Siemens.

In this light, the foundation looks like a ploy perpetrated most artfully by Armonk and Maynard to split a Unix market that is threatening the core proprietary businesses of the industry's two giants. Moreover, HP et alia look as though they've been taken for a ride.

As analytically compelling as this scenario is when fully expanded (i.e., after referencing Ken Olsen's Unix = snake oil comments), its derivation reminds the *Gray Sheet* of the story of the fellow who lost his keys one night. A police officer happened upon him as he was on his hands and knees beneath a street lamp, scouring the ground. After hearing the gent's plight, the officer inquired as to where the keys had been lost. "Over there," the man pointed into the darkness, "but the light makes it much easier to search here."

The OSF has no home, no permanent staff (indeed, not even all the important interim slots have been filled), and no business plan. All that has been decided to date is to go forward with the idea. Vastly more important than what the OSF currently is or isn't, is what the OSF will become.

And that is not solely a function of company intentions. Serious questions about how OSF will operate to insure maximum social benefit must be answered, but there is more going on here than an analysis of the alleged purposeful actions of two companies (even if they are IBM and DEC) can elucidate. Three things in particular have shaped and will guide the emergence of the OSF:

- Increasing market complexity exacerbated by the activities of AT&T and its strategic ally, Sun Microsystems.
- The organizational structure and work flow adopted, and the staff chosen.
- Its success ascending the myriad learning curves it faces, and, therefore, its ability to anticipate and respond to market developments. A near-term priority is selling the whole idea to the federal government.

OSF Competitive Considerations

Both the supply and demand side of the market have called for the implementation of standards for open systems. Vendor-driven organizations such as X/Open and the Corporation for Open Systems (COS) have joined ranks with the

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traditional standards bodies, such as ANSI, NBS, and IEEE, to facilitate the exchange of standards-related knowledge and information.

More as a result of fate than intrinsic correctness, much of this activity has centered on Unix. Because AT&T was for many years enjoined from competing in the computer industry, Unix was widely distributed for only a nominal license fee. The fact that it is written in the C computer language, and not in machine-dependent assembler, made Unix easy to port to new hardware platforms. Its modular design made it easy to add value to once it reached a new architecture.

In an industry where one of the largest fixed costs is the development of operating system software, this state of affairs greatly lowered capital entry barriers, allowing for a great deal of entrepreneurial commercialization of high-tech innovation.

One of these innovators has grown into an industry giant, if not yet in terms of size, then certainly status. Indeed, Sun Microsystems' original innovation might be that it successfully turned the paradox of "open competition" (i.e., competing on the basis of vendor independence) into a highly profitable art.

Today, there are big bucks, IBM-and-DEC-type numbers, to be made in the Unix market. The *Gray Sheet's* rough estimate for the value of the 1987 worldwide (all worldwide vendors of hardware, packaged software, and professional services) Unix market is $13 billion. By 1991, the value of the worldwide Unix market could grow to $35-$40 billion (over 30% CAGR).

One firm that desperately wants more of the Unix spoils is AT&T. Liberated by divestiture in 1983, Ma Bell's track through the computer industry since has been littered with one misadventure after another.

But AT&T is learning. Bolstered by support from the federal government, which frequently specifies compliance to the Unix System V Interface Definition (SVID) in RFPs, AT&T has undertaken a campaign to consolidate the many varieties of Unix into one single version. Specifically, it will legally act to compel Unix licensees to conform to future versions of Unix.

Had this been the extent of AT&T's competitive behavior, independent Unix suppliers might not have balked. But to learn faster, AT&T turned to the master. This past January, Ma Bell took up to a 20% equity interest in Sun Microsystems. It also announced that it was enlisting Sun's aid in future Unix development work and seriously evaluating a central role for SPARC, Sun's RISC platform, in its future systems efforts.

At that point, for two reasons, many independent Unix suppliers cried foul. First, the financial and distribution resources of AT&T combined with Sun's experience in open competition synergistically makes each more potent than before. Other vendors may no longer be able to take their time catching up to Sun, or discount AT&T.

Second, a single, unified, Unix in the hands of a more competitively savvy AT&T petrifies many vendors with strong Unix commitments, including the majority of the OSF's sponsors. Because AT&T intends to develop release 5 of Unix V on Sun's SPARC RISC platform, they fear SPARC vendors will come to enjoy a time-to-market advantage over non-SPARC products. (The release currently in development is release 4. It should generally be available mid-1989).

Furthermore, each Unix vendor has its own established Unix-customer base to service. Presumably, even in the Unix world customers enter into relationships with any given vendor because that vendor adds some value not available elsewhere. Independent Unix vendors feel AT&T's efforts to consolidate Unix could undermine these relationships by extirpating their value-added technologies. Switching costs thus lowered, the natural alternative could be AT&T's or Sun's SPARC platforms.

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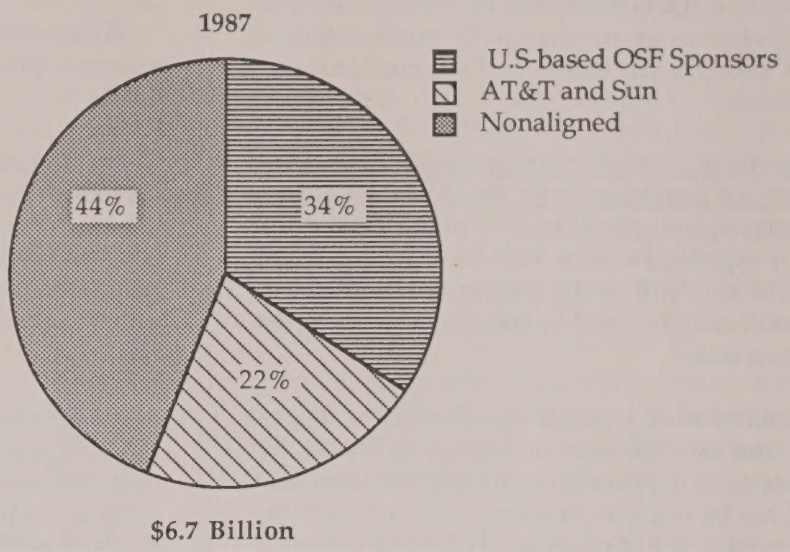
Worldwide Market Shares of Unix Shipment Values by U.S.-Based Vendors' Industry Alliances, 1986-1987

Demand in the Unix-based hardware is very strong. In 1987 the market's value grew 46%, from $4.6 billion to $6.7 billion. It is interesting to note, however, that the fruits of this strong demand were enjoyed by many. Each of the market's segments, as detailed here, experienced very similar growth rates. It is not true that only Sun and AT&T are reaping Unix rewards.



Thus, the schism in the Unix market predates the formation of OSF. The OSF institutionalizes, not initiates, the split.

AT&T has not been proactive in allaying sponsor concerns. No sponsor executives contacted by the *Gray Sheet* indicated that AT&T had ever approached their company to ask them what they, as large Unix suppliers, and their customer bases wanted in Unix. The flow of communication, they complain, is decidedly one way, forcing them to incur significant costs from organizational uncertainty and risk.

(A number, incidently, did mention that since AT&T's track record in the computer industry is not the stuff of legends, they were concerned about having their strategies founded on AT&T's ability to deliver sweeping Unix enhancements, in spite of the Sun alliance.)

Most, certainly the *Gray Sheet*, would agree that the sort of change under way in the computer industry benefits the market. The costs of change, however, must be well managed. By lowering the costs of technology transfer, perhaps the development of standards would be expedited. The OSF could shine as a collective attempt to jointly integrate the process of enhancing Unix and other semi-public software technologies.

In this light, OSF looks like an effort to stabilize a complex decision environment, so that innovations could be incrementally introduced at considerably less risk to innovators, whether they be vendors or users.

OSF Organizational Considerations

Of course, this view is incumbent on the OSF actually behaving like an innovator, and not an impeder. As has been mentioned, there are reasons for concern. In the *Gray Sheet's* opinion, there is also initial cause for optimism, but organizational and staffing moves made in the next few months will be critical to the OSF's continued viability.

Such optimism is founded on four points: the initial plan for allotting the OSF's resources, the intention to establish a culture based on a start-up mentality, the hierarchy of market relationships being established, and the anticipated role of the foundation's board.

As it is currently conceived, the OSF will be structured into four operating groups: a finance/

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planning group for strategic control; a research group to administer third-party research grants and work with the government; a development group to actually do the Foundation's work; and an operations group to oversee marketing support, promotional efforts, and international operations.

Perhaps as much as 60% of the OSF's resources will be dedicated to the development group, translating roughly into 70% of the staff. Another significant slice will be earmarked for grants to third-party research laboratories. Considerably less will be spent on marketing for its own sake.

Unlike other research and development consortiums (at least most in the United States) the Foundation's primary development activities will not be towards delivering raw technology, but market-ready product. The OSF's behavior should be similar to a software start-up planning to be financially self-sufficient in a few years (except that it won't have to face the associated nerve-wracking problem of developing distribution channels).

To be self-sufficient it must be very action-oriented and establish solid relations with as broad a community as possible. All OSF-developed product will be available to the market for a fee. Commercial members (who pay $25,000 per annum) and nonprofit members ($5,000) will be given periodic updates as to the status of OSF work, and, to mitigate time-to-market lags, will in unison be made privy to OSF product.

Sponsors (a three-year, $4.5 million per annum commitment) will be given space to do in-house testing of code, and will automatically receive a spot on the OSF board.

Sponsor control of the board has often been sited as the OSF's Achilles heel, but conversations with OSF board members indicate that the OSF will not operate like a directorate, but as a true independent operating entity. Thus, the board is not expected to concern itself with operational details, but is instead expected to set long-term goals and attend to measuring management performance. Moreover, in time sponsor control may be minimized; the board can expand itself at any time to include representatives of the general membership.

There still are significant organizational concerns that the OSF must satisfactorily address:

- Who are the foundation's customers? At present, it appears the OSF intends to license product to vendors of information technology. It is possible that product for vendors might not best serve users. The OSF must institute user-oriented quality controls to insure user needs are met.

- Who is responsible for conformance testing? OSF licensees can mix and match OSF products, and add proprietary value. There are no plans to institute a mechanism for establishing levels of compliance. That chore will presumably be left to users. But not all users have the resources necessary to qualify conformity. The advantages of open systems should not only accrue to the market's largest customers.

- How will standards ultimately be implemented? A big concern. If the board must be convened to study every proposal, there is a great danger that the OSF will turn into a political body charged with reconciling discrepancies across board members' unique implementations. It is critical that OSF employees be given a great deal of discretion to insure innovation. OSF decisions must emerge, generally, in a bottom-up fashion.

- What will be the quality of the staff? Two of the world's largest Unix laboratories are not represented in the OSF — AT&T's and Sun's. The quality of the people the OSF can attract to its ranks will be critical to the quality of its deliverables. The OSF must recruit top talent, and establish workable systems to retain these people (such as giving developers decision-making authority and attractive financial rewards).

- How will the hierarchy of relationships be managed? U.S. law is ambiguous insofar as joint research and development projects are concerned. The National Collaborative Research Act (NCRA) of 1984 helps clarify the legality

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of such endeavors, but in general, fearing downstream collusion, the U.S. code favors single-firm initiatives, and frowns on joint development. As a result, lawyers and contracts play a huge role in most consortiums. For the OSF to work, however, the hierarchy of relationships must be highly flexible. The OSF must work hard within the system to insure that knowledge and information flow freely, unconstrained by what may be arbitrary legal boundaries.

If the OSF can overcome these substantial organizational impediments, the *Gray Sheet* believes it could be a success.

A Brief Meaning of Success

Success here does not mean mucking-up Unix. Rather, the *Gray Sheet* believes the OSF could provide a mechanism for sharing the risk and uncertainty of invention associated with a semi-public good.

If it lowers the intra- and interorganizational costs of technology transfer, yet at the same time maintains a scheme for appropriating enough of the value of invention to cover an inventor's investment, the OSF could ultimately deliver a more optimum level of innovation than could AT&T and Sun alone.

For instance, by focusing future Unix development work on a common application binary interface for general microprocessors with good market penetration, Sun and AT&T (perhaps inadvertently) may reduce the benefits of future hardware innovation.

But there is no doubt that ASIC and other component technologies could yet have significant roles within a standards-based software environment. Whatever they will be (perhaps a chip for standard SQL processing is an example), these roles are not optimally defined by any single vendor, or any consortium, but by the market.

Vendors, however, must learn to work within the OSF framework. If they can — if true open systems are developed — it could greatly accelerate purchasing of information technology.

As things currently stand, the market is rapidly maturing. IBM, for instance, recognizes that its long-term growth prospects are not tied solely to retaining market share, but are instead more a function of aggregate industry demand. Anything that stimulates demand, stimulates IBM.

The bottom line on the OSF's success, and the best reason for giving it a chance, will be the industry's bottom line.

Money Matters

First quarter results are in, and in spite of last fall's stock market debacle things are looking pretty good.

In aggragate, the *Gray Sheet's* collection of companies registered revenue growth of 16% and a 26% increase in earnings, evidence that the industry is sustaining the rebound begun in the third quarter of last year.

Without IBM, as has recently so often been the case, things would have looked a bit better. But a story within the story about 1Q88 is that IBM exceeded the market's financial expectations. The rebound has apparently (finally) graced Armonk as well.

IBM's gains for revenue and earnings were, respectively, 10% and 16%. The sample sans IBM climbed 19% in revenue and 32% in earnings. It is interesting to note in the midst of trade hostilities and DRAM crunches that the semiconductors/components portion enjoyed the strongest growth.

As a result of a major product transition to its Y-MP line, Cray's performance was relatively weak. Revenue sunk nearly 32%, to $145 million. Earnings fell even more (54%) to $26.4 million.

Finally, due to M&As, odd reporting dates, etc., the sample has been slightly altered.

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Selected Information Industry Financial Results, First Quarter 1988

(Source: Company Financial Reports)

Category/ Company	1Q/88 Rev. ($M)	1Q/87 Rev. ($M)	% Change	1Q/88 Earn. ($M)	1Q/87 Earn. ($M)	% Change
Computer Systems						
Alliant	13.6	12.0	13%	0.9	2.5	-64%
Altos	42.8	40.4	6%	0.6	2.8	-79%
Amdahl	367.7	318.5	15%	43.2	25.2	71%
Apollo	163.9	123.4	33%	10.4	6.4	63%
Apple	867.2	575.3	51%	79.2	33.9	134%
Britton Lee	7.4	5.7	30%	-0.1	-2.0	NA
Commodore	200.3	169.5	18%	9.6	1.0	860%
Compaq	439.5	211.0	108%	46.8	20.2	132%
Computer Consoles	39.2	35.6	10%	3.2	0.8	300%
Concurrent	69.2	64.1	8%	3.6	2.4	50%
Control Data	902.2	821.7	10%	7.7	7.2	7%
Convergent Tech	92.7	73.6	26%	-4.3	-11.0	NA
Convex	22.1	14.4	53%	1.1	2.1	-48%
Cray	145.9	214.1	-32%	26.4	57.2	-54%
Data General*	349.7	315.2	11%	20.1	-42.6	NA
Digital	2,824.0	2,410.1	17%	305.1	307.6	-1%
Gould*	253.0	227.6	11%	7.7	7.6	1%
Harris	524.7	522.3	0%	24.7	21.9	13%
Hewlett Packard*	2,496.0	2,017.0	24%	202.0	162.0	25%
IBM	11,749.0	10,681.0	10%	913.0	785.0	16%
Kaypro	19.5	28.9	-33%	-2.2	0.9	-344%
MAI Basic Four	105.4	78.1	35%	6.3	5.4	17%
Masscomp	19.1	20.3	-6%	0.3	1.6	-81%
NBI	32.3	69.2	-53%	-22.1	-0.9	NA
NCR	1,281.4	1,121.5	14%	74.1	61.5	20%
Prime	363.7	221.7	64%	14.5	11.9	22%
Pyramid	18.9	12.6	50%	2.0	0.4	400%
Sequent	14.2	7.5	89%	1.1	0.8	38%
Silicon Graphics	42.0	22.6	86%	3.4	2.9	17%
Stratus	54.2	37.4	45%	5.9	3.7	59%
Sun Microsystems	259.7	141.7	83%	14.3	10.2	40%
Tandem	309.4	242.4	28%	23.3	22.4	4%
Tandon	80.3	80.4	0%	7.2	5.1	41%
Tandy	839.1	776.9	8%	64.1	50.4	27%
Teradata	25.3	11.6	118%	4.1	0.8	413%
Unisys	2,367.7	2,415.8	-2%	149.3	110.2	35%
Wang	767.9	745.9	3%	22.7	5.9	285%
Subtotal	28,170.2	24,887.0	13%	2,069.2	1,683.4	23%
Peripherals and Communications*						
Alloy	11.2	10.8	4%	0.1	0.8	-88%
AST Research	105.8	55.4	91%	5.2	3.4	53%
Cipher Data	44.7	46.0	-3%	2.5	1.3	92%
Corvus*	6.2	7.0	-11%	2.9	-4.3	NA
Dataproducts	96.0	84.9	13%	-14.9	1.7	-976%
Emulex	31.8	25.8	23%	2.4	1.3	85%
Esprit	5.8	4.2	38%	-0.3	-0.7	NA
Irwin Magnetic Sys	12.1	14.6	-17%	0.1	1.2	-92%

**CCI 1Q88 income includes $1.3M extraordinary credit; 1987 results restated due to accounting change. CDC 1Q income includes tax credits of $3.1M (1988) and $800K (1987). Gould 1Q net from continuing operations before extraordinary loss (1988) or gain (1987) was $9.0M for 1988, $5.6M for 1987. HP for quarter ending April 30. NBI loss on continuing operations was $5.4M in 1Q88, versus profit of $800K in 1Q87. Prime 1Q88 figures include Computervision operations since Feb. 5; 1Q87 figures Prime only. If 67% of Computervision's 1Q87 revenue is added to Prime, 1Q88 revenue growth would be 15.5%.*

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Category/ Company	1Q/88 Rev. ($M)	1Q/87 Rev. ($M)	% Change	1Q/88 Earn. ($M)	1Q/87 Earn. ($M)	% Change
Key Tronic	45.0	33.7	34%	-1.3	0.9	-244%
Maxtor*	85.7	53.9	59%	6.1	8.0	-24%
Micropolis	80.5	61.8	30%	7.2	6.2	16%
Miniscribe	138.6	61.4	126%	10.8	6.1	77%
Network Systems	30.1	20.3	48%	2.8	1.1	155%
Paradyne	57.6	55.9	3%	0.2	-1.9	NA
Priam	37.5	36.1	4%	1.2	0.1	1100%
Quantum*	42.2	31.9	32%	-8.4	2.9	-390%
Rexon	35.7	24.2	48%	3.2	2.0	60%
Seagate	339.1	267.1	27%	23.2	40.5	-43%
Storage Tek	193.3	180.6	7%	8.5	14.3	-41%
Western Digital*	190.7	122.0	56%	8.3	12.5	-34%
Wyse	141.7	77.9	82%	7.7	5.1	51%
Xebec	7.9	22.6	-65%	-2.9	-2.1	NA
Subtotal	1,739.2	1,275.5	36%	64.6	102.5	-37%

** Corvus 1Q88 net includes $2.8 M in gain from discontinued operations, and extraordinary income; Quantum 1Q88 loss due to $13.2 M provision for product discontinuance; StorageTek 1Q net from continuing operations before taxes $.52M for 1988, $15.6M for 1987; Western Digital 1987 figures restated to reflect Faraday acquisition; Wyse 1987 results restated to reflect Link Technologies acquisition.*

Software/Services/VARs						
Ask Computer*	37.0	25.4	46%	2.6	1.7	53%
Ashton Tate	72.4	60.2	20%	11.1	9.1	22%
ADP	418.0	373.7	12%	51.2	39.3	30%
Boole & Babbage	14.0	10.0	40%	0.9	0.5	80%
Comdisco	310.0	276.4	12%	25.0	28.5	-12%
ComputerAssociates*	206.4	102.0	102%	33.8	11.2	202%
Computer Sciences	309.1	290.5	6%	13.9	10.8	29%
Cybertek	5.8	6.4	-9%	0.1	0.3	-67%
Daisy Systems	28.6	23.8	20%	1.3	-4.9	NA
Data I/O	14.6	16.7	-13%	0.1	1.0	-90%
EDS	1,122.1	1,037.7	8%	89.1	64.6	38%
Informix	25.8	7.1	263%	2.5	0.8	213%
Intellicorp	5.0	5.5	-9%	-0.3	0.1	-400%
Intergraph	174.7	128.5	36%	17.1	10.0	71%
Interleaf	18.1	11.8	53%	2.5	0.6	317%
Lotus	117.3	84.8	38%	18.3	13.7	34%
MSA*	62.9	46.5	35%	2.9	-5.2	NA
Mentor Graphics	67.6	50.5	34%	6.9	4.2	64%
Microsoft	161.8	98.4	64%	37.3	19.1	95%
Software Pub.	15.2	10.9	39%	2.8	1.6	75%
Symbolics	17.4	24.6	-29%	-4.9	-2.0	NA
VM Software	8.0	6.3	27%	0.6	0.8	-25%
Subtotal	3,211.8	2,697.7	19%	314.8	205.8	53%

**Ashton-Tate for quarter ending April 30; Ask 1988 figures include NCA; Comdisco income includes $5M (1988) and $15M (1987) from discontinued operatnions; MSA income is operating income rather than net due to the cumulative effect from previous years of an accounting change on 1987 net.*

Semiconductors/Components						
AMD*	284.2	170.1	67%	20.2	-3.3	NA
Chips & Tech.	36.1	22.8	58%	5.5	3.6	53%
Intel	635.8	394.5	61%	93.7	25.5	267%
LSI Logic	73.1	55.1	33%	4.7	2.1	124%
Texas Instruments	1,467.3	1,271.9	15%	85.5	83.8	2%
VLSI Tech	43.8	38.2	15%	-1.5	2.3	-165%
Subtotal	2,540.3	1,914.4	33%	208.1	111.7	86%
TOTAL	**35,661.5**	**30,774.6**	**16%**	**2,656.7**	**2,103.4**	**26%**

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IBM PLUGS HOLES IN PS/2 LINE. IBM introduced, among other things, three new models of its PS/2 family, the Model 70 386, IBM's first desktop (i.e., not standing on its end as a tower) 80386 machine, the Model 50 Z, built with a zero-wait state 80286, and the Model 25 LS, containing a pre-configured IBM Token-Ring Network PC Adaptor.

The Model 70 386 comes in three configurations, distinguished mainly by processor speed (from 16MHz-25MHz, making the high-end Model 70 IBM's fastest personal computer). List prices for the 70s range from $5,995 for the 16MHz machine to $11,295 for the 25MHz machine. The Model 50 Z comes with either a 30MB ($3,995 for the system) or 60MB ($4,595) hard drive. A monochrome or color display option separates the two Model 25 LSs (respectively, $2,139 and $2,484).

The announcement included nothing unexpected, either in the way of additions or omisions. The already existing Model 80 is now positioned, by the arrival of the Model 70, purely as a server. The Model 50 Z basically obviates the Model 60. No more information on DOS 3.4 or the ultimate utility of the Micro Channel was offered.

9370 MARKETERS NOT TO BE OUTDONE. With the PS/2 people having strutted their stuff, and with the S/3X folk getting ready to fire up their campaign, the 9370 crowd has adjusted strategies to move their beleaguered box. Two main software pricing actions were taken. First, IBM restructured its S/370 software graduated pricing schedule. At the low end of the scale, the Group 10 prices were slashed 25%. Also, a new Group 15 was introduced, which will make software for a 9370 Model 60 running VM in an office environment approximately 50% cheaper. Second, to better reflect the market characteristics emerging for the 9370, the volume discount schedule for 9370 software has been rewritten.

Initially, IBM anticipated most 9370s being purchased as part of large volume orders. That has not proven true. Instead, most 9370 orders are for between two and twenty machines. As a result of the new schedule Group 10 or Group 15 customers will receive a 25% discount when they purchase only two copies of a program. When they purchase 20 copies, they will receive a 40% discount.

DELL SQUARES WITH IBM FOR IPO. Big day for the wunderkindof PC hardware. On the same day the business wire bristled with two bits of news about Michael S. Dell's Dell Computer, Inc. (formerly PCs Limited): it became the first compatible vendor to reach a PC patent license agreement with IBM and filed its initial public offering. From its prospectus the *Gray Sheet* learns that Dell expects to "pay IBM royalty fees of up to 3% on the Company's sales of substantially all current and future personal computer products." Moreover, contingent upon IBM being granted Micro Channel patents currently pending, Dell will pay up to an additional 2% on sales of Micro Channel products. By controlling over 75% of common and holding the right to elect all but two board members, Michael S. Dell will still retain a virtual lock on the company after the IPO. This has jarred some analysts, who are concerned that Dell won't feel compelled to decentralize authority. One area where Dell's hands-on management style could cause problems is in the company's channel strategy. The company may have to adjust its channel positioning, currently concentrated on telemarketing, to accommodate IBM's, Compaq's, and the retail channel's increasing emphasis on hand holding.

THE LITTLE SUIT AMONG FRIENDS. Two interesting developments in the Apple vs. HP and Microsoft. First, Apple acquiesced to Microsoft's request to bifurcate the suit, apparently as a result of a legal technicality. In effect, Scully's lawyers will now pursue HP independent of Microsoft. Not long thereafter, however, Microsoft's chairman, Bill Gates, announced major upgrades to his company's Macintosh applications. Meanwhile, HP has filed a motion to disqualify a law firm Apple retained to assist in the case, claiming that two of the firm's partners, having previously worked for HP, hold intimate knowledge of HP's case.

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THE GRAY SHEET
Computer Industry
REPORT

PETER L. BURRIS, EDITOR MAY 18, 1988 • VOL. 24, NO. 1 PATRICK J. MCGOVERN, PUBLISHER

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Cullinet's New Form, and Old Problems

"We are tired of catching pneumonia every time IBM sneezes."
A senior Cullinet executive, early 1987.

For three years now, Cullinet, once the leading independent DBMS vendor, has had a bad case of corporate flu. The combination of slow growth in IBM mainframe shipments and strong demand for IBM's mainframe-oriented relational DBMS program, DB2, led to Cullinet's malady.

Cullinet's management prescribed spending to treat the ailment. A number of companies were acquired and a very ambitious product development schedule, intended to yield an integrated line of DBMS tools for the high-growth VAX market, was undertaken. During the past 15 quarters, Cullinet has spent in excess of $147 million on R&D — more than 21% of revenue for the same period.

Unfortunately, the development schedule lagged, programs were late, and demand for the existing portfolio was too weak to support Cullinet's growth in overhead. Its financial situation declined. Seven straight quarters of losses culminated in 3Q88 (ending 1/30/88): The company accumulated over $18 million worth of red ink (including a $13 million one-time charge) on just over $54 million in revenue.

Not surprisingly, Cullinet's management has been relegated to *previous* management status. The new regime has decided to take stronger fiscal medicine, announcing a restructuring and reduction in force it hopes will help return the company to the black by 3Q89. The move is a bitter pill to swallow:

- Four hundred of the company's 2400 positions have been eliminated, a work force reduction of nearly 17%.
- Cullinet restructured its marketing and product development organizations to absorb the losses in headcount, and to develop fiscal accountability. Cullinet will write off the $8 million restructuring cost in fiscal 1988.
- On the development side, functions have been integrated by product line, fostering what Cullinet calls "product ownership." Product-specific teams will oversee, and be accountable for, all development activities, from requirements definition to coding to technical documentation.
- Marketing changes were similarly conceived. By splitting marketing endeavors along product and corporate lines, Cullinet could bolster its strategic marketing capabilities (such as competitive analysis, product positioning, sales training, etc.), and work to improve an image tarnished by events of the last three or four years.
- Nonstrategic ventures, such as Computer Strategies, Inc., and Planning Control, Inc., are being divested or sold.
- Cullinet believes $25 million will be saved in FY1989 by these moves.

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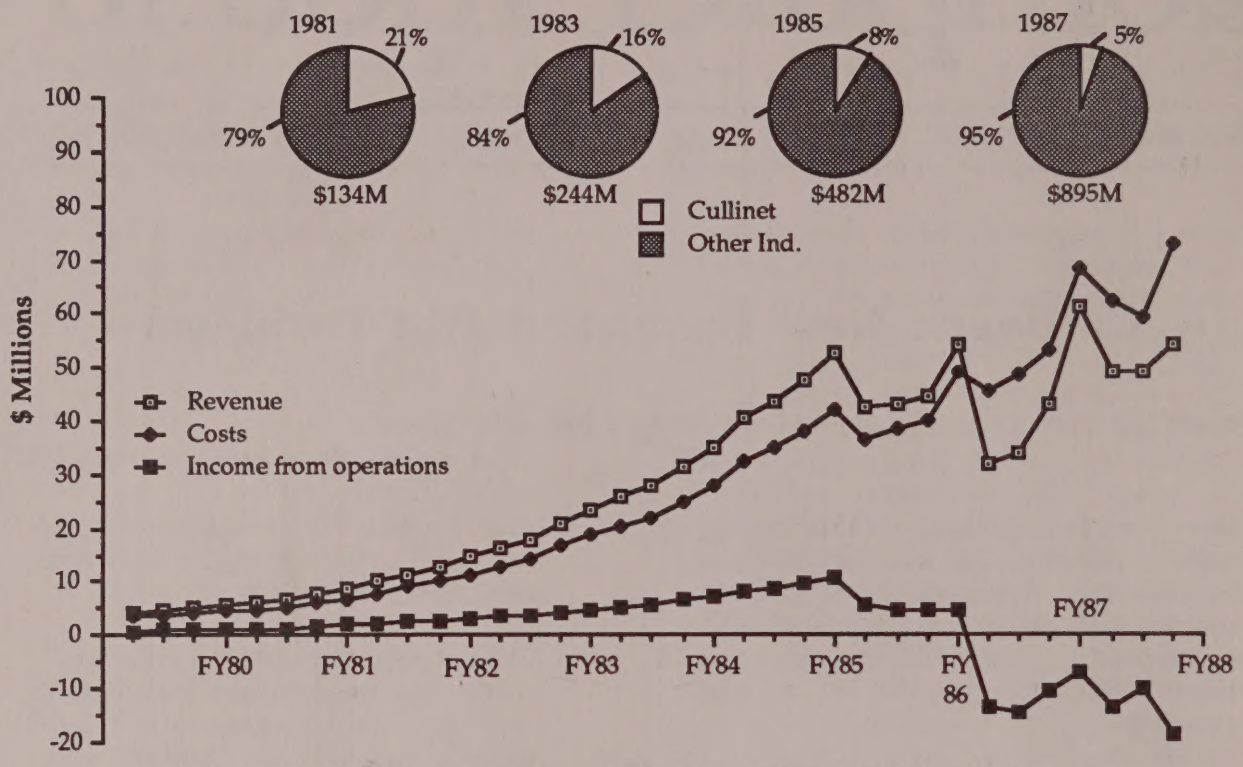
Cullinet's Profits Plunged with Independent DBMS Market Share

(Source: International Data Corporation, 1988)



Cullinet Financial Performance by Quarter (for FY ending 4/30)

Cullinet's financial performance has, and will remain, closely aligned with the company's success in the DBMS marketplace. Cullinet's mid-1980s decision to wage a PR campaign against the relational DBMS model, instead of enhancing its DBMS technology to stay current, put the company well behind the industry growth curve. It remains to be seen whether or not Cullinet can catch up.

Turnaround Mode and New Markets?

It was not too long ago that Cullinet epitomized vitality in the independent software market. For 29 straight quarters the company enjoyed solid earnings growth. Cullinet's destiny, it was held, was to be the IBM of the independent software market.

In two most unflattering respects they were successful. Cullinet, like IBM, was slow to recognize fundamental change in the computer industry, namely interactive, end-user-oriented computing. Also like IBM, Cullinet's strategic miscues led to the unthinkable: a persistent drop in earnings and share of primary markets.

In Cullinet's case, however, the earnings descent was considerably more precipitous. Since the fourth fiscal quarter of 1985 (fiscal year ending 4/30), the company has enjoyed only four quarters of earnings growth. Two of those quarters came at ends of years, and were most certainly bolstered by normal earnings cycles.

Worse, the company has not been profitable since 4Q85. In addition to the aforementioned $18 million deficit, on three occasions Cullinet

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experienced losses in excess of $10 million on sales of less than $45 million.

The restructuring indicates the arrival of full-blown turnaround mode in Westwood, MA. Cullinet has been steadily improving its accounts receivables collection situation, and the new reporting structures should make it easier to manage cash throughout the organization.

However, now that Cullinet's massive development activities are bearing fruit (the VAX DBMS, IDMS/SQL, and its integrated tool set were officially introduced in early April), the programs must be commercialized (i.e., brought to market). That requires bucks, and lots of them.

Cullinet's new, and very great, challenge is, on the one hand, to manage cash, and on the other hand, rapidly ascend the very steep learning curve and hurdle the entrance barriers associated with the VAX software tools market.

Obviously, its most formidable competitor will be Oracle, with its astounding national and international distribution capabilities. But among others, RTI, Sybase, Cincom, Informix, and of course, DEC, are all established players with considerably greater VAX market experience, and very competitive products.

Cullinet hopes to overcome the apparent cash tight/cash required contradiction by marketing to what the company perceives to be a new class of VAX customers: traditional IBM users installing, or having recently installed, VAXs. Its marketing and sales executives hope to be able to build and hold an advantageous position in this particular heterogeneous commercial processing environment.

In one way, this comes as no great surprise. Cullinet has for the past year maintained that VAX product sales would naturally flow from its existing installed base. The company's senior management regularly cited internal studies showing 50% of their customer base owning VAXs.

A nice, but by itself a rather meaningless figure. To begin with, it makes no mention of which functions Digital has penetrated among Cullinet's customer base, or of what size the machines are. If most are MicroVAXs supporting technical users far from the glass house, Cullinet gains little advantage. Moreover, on the basis of IDC statistics, the ***Gray Sheet*** believes that more than 50% of all IBM-held large-scale system accounts have a VAX installed somewhere in the organization, regardless of who the mainframe DBMS supplier is.

Far more surprising, and more fortuitous for Cullinet, is that, according to company estimates, 60% of its VAX-product seminar audience is from large, and until recently, true blue shops that have no Cullinet product currently installed. On the basis of this figure, Cullinet believes that the VAX DBMS market is moving to its home court (i.e., the sales cycle is beginning to take on a form similar to that characterizing the IBM DBMS market). If true, for Cullinet to crack new accounts it may not be

What Went Wrong In Westwood?
Remembering the "Great Relational Debate"

Late in 1985, Cullinet's John Cullinane and relational DBMS guru E.F. Codd took to the pages of *Computerworld* to argue the utility of the relational DBMS model. For Cullinane, the relative inefficiency, and therefore weaker performance, of relational technology was the issue; for Codd, higher user productivity was the cause to be trumpeted.

The plot within the plot was Cullinet's own development and marketing plans for its non-relational mainframe database, IDMS.

The debate was more than winter entertainment for MIS folk. It heralded the coming importance of interactive, on-line processing to the glass house. And, because Cullinet fundementally failed to recognize this trend, the now three-year long trial for Cullinet. History has crowned Codd the victor.

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immediately necessary to spend precious dollars to construct a VAX-specific sales capability beyond that which it currently holds.

Therefore, expect no major sales hirings from Cullinet in the near term. Instead, the company's existing sales force will receive heavy VAX training. Educating salespeople will be Cullinet's number one priority, and number one marketing expense, in the coming year.

As for alternate channels, they too will have to wait. Cullinet does not want to seed the VAR channel with new products, but rather will wait until these prograrams have gained greater market acceptance. Perhaps within the next six months to a year the company will begin courting major VAR application houses.

Furthermore, Cullinet's poor international performance relative to other major independent tools vendors appears certain to continue for a while. As users increasingly implement information technology systems on a global scale, Cullinet's international weakness increasingly becomes a competitive disadvantage.

Only systems integrators, which may control procurements of tens, even hundreds, of copies of midrange DBMS programs, are being pursued. For instance, Systems House was active in the IDMS/SQL announcement.

Here, then, is Cullinet's problem: If it is wrong, and the VAX DBMS market is not becoming more like the IBM DBMS arena Cullinet has known so well, without traditional VAX distribution muscle it may have difficulties getting IDMS/SQL in the door.

The *Gray Sheet* believes Cullinet has a major tribulation before it. With new management and tightly limited funds it must enter an unknown and highly competitive market with very well entrenched players. Estimates floating around the industry, which anticipate Cullinet capturing an 8-10% share of VAX DBMS installed base by this point next year, are most certainly overoptimistic. Cullinet has told the *Gray Sheet* that it would be ecstatic with a 3-4% share, or approximately 1,000-1,300 ships in fiscal year 1989, but, given the dynamics of the competitive environment, this figure may also be quite high.

Rumors and the 3 x 3 Strategy

Since funding has become so important to Cullinet, some have speculated that the company is preparing to be acquired by a cash-rich suitor. The *Gray Sheet's* perspective, on the basis of conversations with senior Cullinet officials, is that while this makes academic sense, it underestimates the company's resilience.

To begin with, Cullinet as a company is no stranger to undervaluation. It was not even three years ago that Chairman John Cullinane resolutely led his troops against unwanted encroachment on Cullinet ownership. Cullinet is today no more likely to proactively run into the arms of a white knight to escape the potential clutches of a hostile takeover.

Secondly, Cullinet has always gone it alone. Its corporate culture is predicated on independence from larger, and control of smaller, partners. The company has never played well with other children. And, with the single exception of the American Express banking software arrangement inked last fall, current management shows no indications of a desire to become any more social.

Thirdly, and most importantly, Cullinet's other products have been selling, just not well enough to support the explosive growth of costs. The 3 x 3 strategy of database, tools, and applications across three strategic platforms of mainframe, mini, and microcomputer was well conceived, but too expensive as implemented. Cullinet sources anticipate revenues for fiscal 1988 will top the $200 million mark, a growth of approximately 9% — quite respectable for a company that has been playing predominantly in the slow-growth IBM mainframe software industry.

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The next major development priority is a technologically sound implementation of SQL within the IDMS/R kernal. Cullinet's existing DBMS customers have bided their time as Cullinet prepared the VAX thrust. Now they want some attention. Unless Cullinet delivers, IDMS/R customers may begin defecting. That would severely undermine Cullinet's already fragile 3 x 3 strategy.

In other words, Cullinet does not want to find itself in the position of trading vulnerability to IBM for a Digital-related disease.

It is true that, by some measures, the VAX DBMS market penetration is small — consistent with Cullinet estimates, perhaps only 25-30% of all VAXs have a DBMS program installed. But the effective DBMS penetration, (i.e., after removing many technical sites and smaller MVAX sites) is certainly much higher.

How high? Of all VAXs installed in the U.S., 64% are MicroVAXs. Add in larger VAXs operating as front ends or in VAXClusters (where only one DBMS license is warrented), and the effective penetration could be as high as 80-85%.

Moreover, many of these sites are no longer evaluting which DBMS to buy, but how many copies of an already installed DBMS program should be procured. Cullinet is, in reality, looking at selling to a relatively small slice of the VAX market.

And one being heavily contested for at that. Digital's market may already be losing momentum. In any event, growth in the number of new VAX DBMS targets is not assured. As Digital itself looks to software as a source of revenue and account control — indeed, the *Gray Sheet* anticipates a major Rdb announcement soon (see the *Gray Sheet*, V. 23, N. 22-23, March 4, 1988) — Cullinet must be careful not to repeat past mistakes.

Amdahl's 5990 High-End Offensive

IBM's recent large-scale systems moves have apparently destabilized the tenuous cease-fire in the mainframe market. Since the arrival of Sierra, most of the competitive battles between IBM, its PCMs, and other mainframers have been border skirmishes in comparison to the all-out MIPS war that took place earlier this decade. Amdahl's announcement of the general computing market's most powerful uniprocessor, however, may mean an escalation.

Introduced were three new processors, a new controller, and two new storage devices. The controller and storage devices are Amdahl's answer to IBM's 3990 and 3380 J and K announcement of last fall. One of the processors is positioned opposite IBM's 3090 280E, rolled out in February. But the heart of the announcement is the other two processors. Amdahl's new high-end 5990s — the two-way 5990-700 and four-way 5990-1400 — represent the most aggressive PCM play in years.

The bricks of these new products are of Japanese origin, but the houses are red, white, and blue through and through. At the component level, with few exceptions, Amdahl has appropriated Fujitsu's M-780 family. But insofar as function is concerned, Amdahl has told the *Gray Sheet* it dedicated more than three years of R&D and $300 million to insure plug compatibility with IBM's evolving technology. A few of the similarities and differences:

- Similar — The 5990s' CPU is identical to Fujitu's, employing the same VLSI design and constructed on the same ECL chips. The only difference is that Amdahl has tweaked the cycle time one-half nanosecond to 10ns, which it claims is the fastest in the industry. Amdahl reports the 5990 architecture and these quick chips will increase throughput in conventional processing environments by up to 50%.

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A Glance at Fujitsu's M-780 Family, May 1988

(Source: Vendor claims and International Data Corporation, 1988)

As to what we might expect in the way of future models of the 5990, the *Gray Sheet* presents some specifications of Fujitsu's M-780 series. Amdahl's currently announced 5990s, the 5990-700 and the 5990-1400, are apparently based upon, respectively, Fujitsu's M-780-20 and M-780-40.

Model	# CPU	MIPS*	Main Memory (MB)	Channels	CPU Price (MYen)	CPU Price ($M)**
M780-10R	1	20.2	32-256	16-64	574	$4.6
M780-10S	1	26.5	32-256	16-64	764	6.1
M780-10	1	34.4	32-256	16-64	924	7.4
M780-20S	2	48.3	32-256	16-64	1,183	9.5
M780-10SMP	2	48.3	64-512	32-128	1,528	12.2
M780-20	2	63.9	32-256	16-64	1,508	12.1
M780-10MP	2	63.9	64-512	32-128	1,848	14.8
M780-30	3	87.3	64-512	32-128	2,294	18.3
M780-40	4	104.5	64-512	32-128	2,584	20.7

*MIPS are a ratio of commercial performance based on vendor claims.
**Based on April 29, 1988, dollar/yen exchange rate in NewYork City.

- Similar — The main memories of each machine are built of identical CMOS static random access memory (SRAM) chips with 55ns memory access times. Also, "patrol circuitry," a self-checking error detection mechanism for main and control memory, is common to both the Fujitsu and Amdahl machines.

- Different — The first and foremost 5990 distinction is Amdahl's inclusion of up to 2GB of expanded storage, a market "must-have" for ESA compatibility. Amdahl has subjected expanded storage to the same patrol circuitry as main and control storage.

- Different — The 5990 channels operate at 4.5 MBps; Fujitsu's run at 3.0 MBps.

- Different — Multiple Domain Facility (MDF) has been enhanced to allow dynamic partitions and joins, something IBM's PR/SM provides as well. MDF remains a key Amdahl selling point.

- Perhaps as much as one-third of the macrocode employed in the Fujitsu M-780 was rewritten to make Amdahl's 5990s S/370 compatible. And therein lies another major distinction: the M-780s are not plug-compatible.

No, Repeat, No Upgrades Allowed

Building the 5990s was a masterful stroke. But rationalizing them to the mainframe market may ultimately be trickier.

Amdahl has not provided a physical upgrade path from older 5890s to the new 5990s. Very attractive financial swaps are made available, but the 5890 must be physically hauled off its foundation, and the foundation rebuilt to accommodate the new 5990.

Bad news for customers. For two reasons, potentially worse news for Amdahl. First, the company is faced with a classic product marketing problem: how to stimulate demand for the old boxes when all know full well their limited life?

The *Gray Sheet* believes that Amdahl will slowly phase in the rest of the 5990 family to make the growth path within the 5890s attractive. Not all customers will be prepared to

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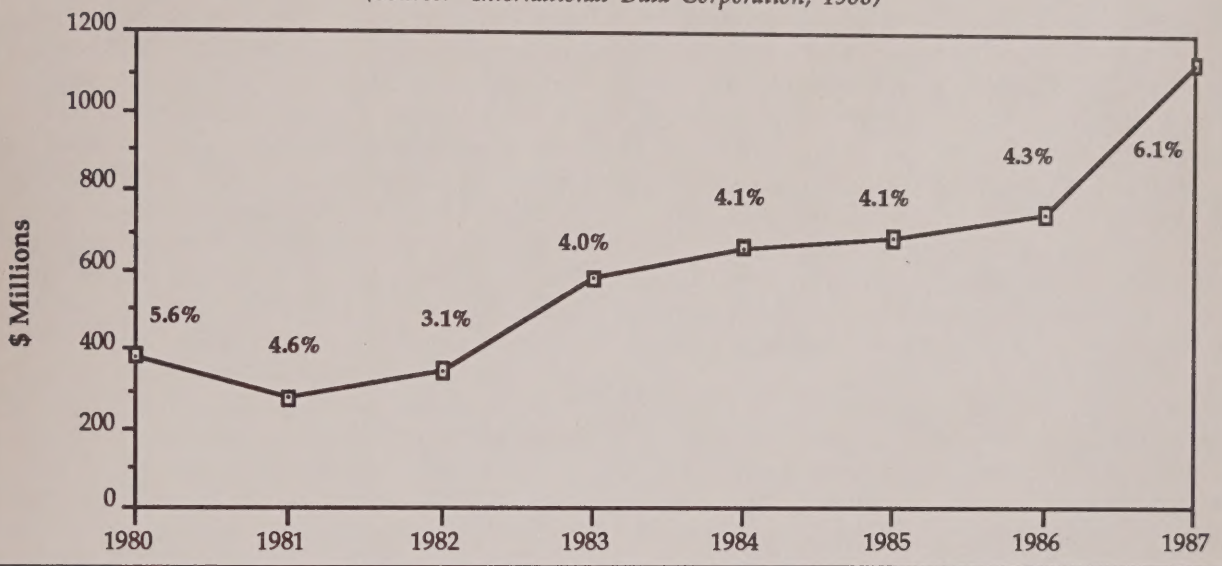
Amdahl's Worldwide Value of Large-Scale System Shipments and Market Share, 1980-1987

(Source: International Data Corporation, 1988)



make a 5990-type commitment. Those still evaluating their high-end processing needs, but requiring near-term help, may still look to the 5890 upgrade scheme to help minimize their uncertainty. Amdahl may be able to buy a year's worth of 5890 sales with this strategy, but IBM's 3090 F-series will certainly ferret out a few more 5990s, undermining the 5890's market value.

Which leads to the second point. Amdahl has jumped on a three-year generational cycle, yet mainframes are typically amortized over five years. That's two years worth of DP write-offs certain to make neither the glass house, nor the corner office, happy. And note, with the Summit announcement expected within two years, and an Amdahl response a certainty, the company will be unable to explain away this instance of timing as unique.

In an Amdahl-perfect world, perhaps upgrades would have been a snap. But then, in that same world, IBM would still be displaying more concern for Digital and less concern for its mainframe business. ESA is fast becoming reality, and Amdahl had to prove its technical capability to support it. The 5990s, by including expanded storage and improving Amdahl's horsepower, meet the major challange, even if they create some lesser hurdles in the process.

IDC, InStat Ink Research Alliance

The *Gray Sheet* takes great pride and pleasure in announcing the formation of a strategic alliance between International Data Corporation, a preeminant provider of market information on the information technology industry, and InStat, Inc., a most respected source of knowledge on the semiconductor industry.

What this means for readers of the *Gray Sheet* is enhanced coverage of the semiconductor market, a critical determinant of computer industry trends. Future *Gray Sheets* will explore semiconductor industry issues in detail.

The editorial staff of the *Gray Sheet* looks forward to better serving our readers in this way.

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CHIP SHIPS ZIP. Speaking of semiconductors, statistics released by the Semiconductor Industry Association (SIA) show strong gains in demand in the U.S. semiconductor market. April billings (shipments) to the U.S. customers rose to $993.9 million, the second highest four-week monthly total in history (after the total of $1,014.6 million registered in August, 1984).

Bookings (new orders) were also strong in April. U.S. chip customers collectively booked a four-year high of $1,214.0 million worth of chips.

The SIA reported all chip product segments as participating in the good news, not only individual logic or memory components. However, DRAM shortages remain a problem as Japanese supply is constrained by the trade bill, U.S. memory makers evaluate capacity expansion risks, total demand for memory increases, and the computer industry cycles to demand for 1Mb chips. One vendor, Sun Microsystems, has elected to pass on higher DRAM costs resulting from the constrained supply in the form of a "temporary surcharge."

IBM TO CLONES: "AND BY THE WAY. . ." Armonk has issued a condition for PS/2 Micro Channel licensing sure to complicate the compatible scene. Prospective Micro Channel licensees must first demonstrate that they did not infringe upon IBM's PC XT or AT patents. If they cannot, IBM intends to levy a retroactive fee for using Big Blue technology. This fee amounts to 1% of sales of products incorporating IBM's patents through April 1, 1988.

The *Gray Sheet* has discerned four possible rationales for IBM's move. One, as a way to generate some easy cash. Two, as a way to control entrance into the PS/2-compatible business— in effect, to keep out low-cost riffraff. Better established clone vendors generally hold cross-licensing agreements with IBM that limit cul-pability. Three, as a legal tactic for establishing and protecting patent rights over PS/2 technology. By not legally pursuing clone vendors who might have infringed upon IBM's previous generation of PC technology, providers of compatibles can argue that IBM's leniency established a marketwide *modus operandi*, and that any attempt by IBM to alter this competitive foundation by litigious means constitutes anticompetitive behavior. Thus, a prerequisite to attacking PS/2 infringements may be a more tenacious stance on PC technology. Fourth, and finally, as a mechanism for influencing the cost structures of compatible vendors who continue to market PC clones. IBM may be affixing a premium to such vendors' operating costs to bring them more in line with PS/2 costs.

In any event, it seems clear that IBM's actions come in response to Micro Channel overtures from compatible vendors. Already Tandy and Dell have announced intentions to introduce PS/2 clones. Others were expected to follow suit. IBM's actions cloud the future of PS/2 and PC compatibility.

UNIX MAKES STRANGE BEDFELLOWS. On Tuesday morning, May 17, leaders of seven of the world's largest computer manufacturers collected in the basement of the Equitable Building (no pun intended, we're sure) in New York to announce an unprecedented alliance. Apollo, Digital, Groupe Bull, HP, IBM, Nixdorf, and Siemans each have committed up to $4.5 million a year for the next three years to fund the Open Software Foundation (OSF). The stated purposes of OSF are to research and develop software technology for application portability, interoperability, and scalability, and to maintain an "open process" in doing so.

Which leads to the unstated purpose: wrest market control of Unix from AT&T and Sun. AT&T's track record to date with Unix has been mixed. On the one hand, it has generally been very open about allowing competitors to adopt Unix with few restrictions. But that is changing. AT&T intends to rigidly enforce compliance to the interface specifications of the next release of Unix, V.4. On the other hand, AT&T has shown no great facility for making Unix better. None of the sponsors of OSF have any desire to stake their competitive futures on either AT&T's altruism, nor its reputation for getting things accomplished in the computer industry.

(Note: This story will lead the next issue of the *Gray Sheet*, so please stay tuned.)

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